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Improving the French GreenTech ecosystem to better support GreenTech startups

Master's Thesis

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ABSTRACT OF THE MASTER'S THESIS

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Global warming and environmental issues foster the emergence of GreenTech startups. To promote their creation and support their growth, a wide variety of institutions exist. The diversity of actors in the French GreenTech ecosystem makes it difficult for startups to identify the most appropriate actor at each step of their development and for each one of their specific needs. Bpifrance, the public bank for innovation in France, wishes to know how to consolidate this ecosystem. This work aims at providing a clear vision of the GreenTech ecosystem in France, and at identifying potential lacks in the support to GreenTech startups.

Based on prior literature and semi-structured interviews, the study examines how GreenTech startups are supported by the GreenTech ecosystem in France and how this support could be improved.

Seven GreenTech startups and twelve GreenTech institutions from various sectors were interviewed. Results of the discussions reveal that GreenTech startups do not face any specific needs compared to other startups, but struggle to find appropriate assistance. Three reasons explain this situation: the opacity of the GreenTech ecosystem, insufficient interactions between actors of this ecosystem, and a lack of industrial R&D facilities.

A mapping of the GreenTech institutions in France, and their role at each development stage of a startup, delivered at the end of this study, helps to bring some clarity to the ecosystem. To improve the ecosystem, several recommendations are also given. Bpifrance can support the French GreenTech ecosystem with the creation of a GreenTech community, by rewarding newly formed partnerships between actors of the ecosystem, and by sensitizing institutions to green technologies and their importance. GreenTech actors should formalize further their support to GreenTech startups in order to measure their impact & their efficiency and offer more industrial R&D platforms for startups to be able to scale more rapidly.

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Table of Contents

Preface

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List of Figures

List of Tables

List of abbreviations

EE: Entrepreneurial Ecosystem

GT: GreenTech

ITE: Institute for Energy Transition

IP: Intellectual Property

KPI: Key Performance Indicator

MVP: Minimum Viable Product

TTO: Technology Transfer Organism

SATT: Technology Transfer Accelerator Offices

1. Introduction

Facing the growing threat of climate change, many scientists and entrepreneurs have been trying to take action and to offer solutions that could help humans and industries decrease their environmental impact, especially since the early 2000s (Goldstein, 2018). Those initiatives are giving rise to the emergence of a specific kind of startups called "GreenTech", "cleantech", "eco-tech" or "enviro-tech" startups, which are created to reduce the environmental impact of human activities with new technologies (Hoff, 2012).

More recently, the creation of GreenTech (GT) startups is being increasingly supported by governments, trying to respect their commitments and improve their emissions-cutting efforts (Ministère de la transition écologique et solidaire, 2017). In France, President Emmanuel Macron claimed his will to elevate the status of France to a "start-up nation", with a particular focus on the cleantech sector (Macron, 2017). This support is reflected by the apparition of new actors, specifically dedicated to the assistance of GT startups, and the integration of new services in existing structures (Roullé, 2020). A wide variety of actors exist to foster the creation of startups: technology transfer organisms, laboratories, incubators, competitive poles, … All these actors bring specific services, and it can be hard to identify the right ones since the offer is very fragmented (Aré, Aractingi, Ferré, & al., 2018).

The French public investment bank, Bpifrance, became a "bank for climate" in 2019 and initiated a "Climate Plan" in 2020. Bpifrance wants to support the environmental transition by investing in GreenTech startups. Therefore, the bank wishes to know which GT actors are currently supporting the creation of GT startups and which role she can play, as a new GreenTech actor.

This study aims at offering a clear vision of the GT ecosystem in France in order to understand how GreenTech actors are supporting the creation and the growth of GreenTech startups, and how this support could be improved.

The analysis of several GT startups raises the question of their specific needs. In the prior literature, one special requirement which has been well studied is related to financial funding, mainly because investing in GT startups can be a lot riskier (Baltes & Büchele, 2015). However, the four other aspects associated to the creation of a startup – business, law, product and team (Bpifrance, 2019), have been quite overlooked: no prior study clearly stated the presence or the absence of *specific* GT startups needs and no precise recommendation to support GT startups has been clearly formulated. Thus, GT actors might struggle to offer the right assistance and services to such startups. Moreover, discussing with numerous GT startups, it appears that the current French GT ecosystem is utterly opaque for them. For Bpifrance to know how to reinforce and complete the support of existing GT actors, the following research problem was addressed:

How are GreenTech startups supported by the GreenTech ecosystem in France and how could this support be improved?

The research problem was further divided into three research questions. The first research question is related to the context of GT startups creation. By answering this question, needs for the creation of GreenTech start-ups were identified.

RQ1: Which supports do GreenTech startups need to be created?

The second research question addresses the methods and supports currently offered to GreenTech startups in France. The goal is to understand which tools, infrastructures, utilities and resources are available for such startups, and where they can be found. These resources are relevant for GT startups who are looking for support, as well as for GT actors willing to re-direct start-ups to the right interlocutor.

RQ2: What kind of services do GreenTech actors offer to GreenTech startups?

The third and last research question relates to the existing collaborations between GT actors. The answer to this question gives clear insights into the actual French GT network and the interactions between GT actors. It underlines a lack of interactions between some GT actors, which could be strengthened.

RQ3: How do GreenTech actors work together?

To answer these questions and address the research problem, an inductive qualitative research was conducted. Prior studies as well as general information found in the websites of GreenTech actors were used as a basis for this study. However, the absence of clear information about the structure and organization of the French GreenTech ecosystem justified the choice of an inductive qualitative research. Data was collected through organic research and interviews of two types of actors: GreenTech startups and GreenTech actors. 11 GT actors and 5 GreenTech startups were interviewed through semi-conducted interviews of the length of thirty minutes each, without recording. GreenTech actors were selected among six of the seven main GreenTech actors' categories identified in the literature review. Thus, interviewees were individuals in charge of the development of GT startups within their structure, and CEOs of GreenTech startups. For the GT actors, interviewees were selected among the main types of actors in the French entrepreneurial ecosystem: incubators, TTOs, SATTs, Carnot Institutes, competitive pole and technological poles; and among actors possessing expertise in one GT sector at least (energy, environment, mobility & transport, agriculture & agrifood, durable construction, green chemistry & biomaterials). Therefore, the findings of the study are of high relevance for any GT actors willing to play a role in the French GT ecosystem.

This study has several results. First, it shows that GreenTech startups have the same needs as DeepTech startups. Thus, no specific GreenTech startups needs exist: the only specific needs they have are related to their highly technological character. Second, the GreenTech ecosystem in France is still under construction: the roles of each actor are unclear for Greentech startups, and interactions between actors are rare. Finally, there is a lack of industrial platforms or centers that GreenTech startups could use in their pre-industrial phase, to scale up; and a lack of a real GT community on which GT startups could rely on to share good practices, get advice from peers and to be inspired.

Initially, this study was commissioned by Bpifrance. Thus, it gives some recommendations to the company, to strengthen the French GT ecosystem by being a part of it and by fostering interactions between GT actors. The study also serves the needs of French GT startups and GT actors. For the former, the findings and discussion help to identify the right GT actors able to support them along their different development stages. For the latter, the findings give them an insight of the image they

convey to GT startups, and recommendations offer them some clues to improve their support.

After this introduction chapter, comes a literature review consisting in two chapters. First, the development process of GT startups is explored, with the description of the development path for generic startups and the definition of the term “GreenTech”, uncovering some needs labeled as specific to GT startups by prior literature (Chapter 2). Second, basic notions to understand the structure of an entrepreneurial ecosystem are given, and the main actors of the French GT entrepreneurial ecosystem as well as a snapshot of GT startups in France are described (Chapter 3). The empirical section forms the third part of the study and describes the role of 11 GT actors in the French GT ecosystem as well as the various needs of 5 French GT startups. The fourth chapter reports the methodologic choices determined from literature review’s results. Following the data structure described in Figure 8 & Figure 9, the sixth chapter exposes the findings of the study, based on the interviews. In this chapter, the three research questions of the thesis are addressed. The discussion section reveals the lacks in the French GreenTech ecosystem and gives recommendations to Bpifrance and GT actors to improve this ecosystem. Finally, Chapter 7 serves as a conclusion of the study. The overall structure of this study can be examined in Figure 1.

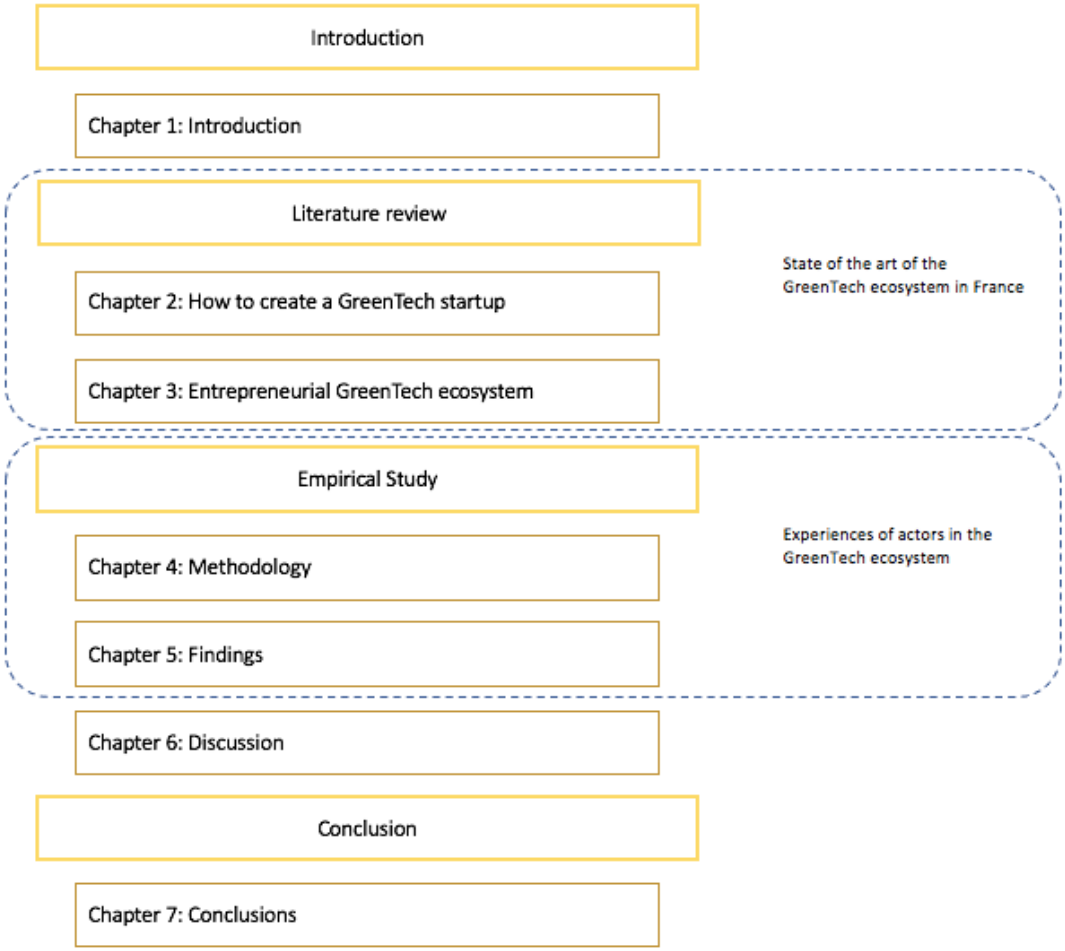

Figure 1: Structure of the study

2. How to create a GreenTech startup

GreenTech startups, like any other startups must go through several stages before addressing the market and then expand. This chapter exposes the generic path for startup development and defines the term "GreenTech", before focusing on needs, challenges and obstacles faced by GreenTech startups in particular.

2.1 Generic startup development

Although each entrepreneur's journey has its own particularities, the Boston Consulting Group (BCG) identifies five typical steps for the development of a startup (The Boston Consulting Group, 2018), from the emergence of the innovative idea to the international growth. These five steps are depicted in Figure 2.

Figure 2: Five steps for startup development

Before going deeper in the description of these five phases, it is crucial to keep in mind that the startup creation process is, at the beginning, iterative. The ideation and creation phases are usually repeated several times before the product or service offered by the startup truly matches customers' needs and desires. The lean startup method developed by Eric Ries (Ries, 2012) and the design thinking method (Martin, 2009) describe how to rapidly test the market and to adjust the product based on customers' feedbacks, repeatedly, until the offer finds its market. The linear description of startup development was chosen here for a better understanding of the entrepreneur's needs.

Each one of the five stages described by the BCG can be characterized by a certain objective and distinct requirements in terms of business, team, legal aspects and finance (The Boston Consulting Group, 2018). The specificities of these five steps are described hereafter.

Ideation

The first step is related to the structuration and validation of the innovative idea. The entrepreneur must define, and test with potential customers, the strategic positioning of the offer as well as a first business model (Riel, Neumann, & Tichkiewitch, 2013). If needed, the technical feasibility has to be validated by experts. Of course, an entrepreneur is rarely alone but if he or she is, a cofounder should be found at this very first stage. This first small team must present complementary profiles: in the fashion sector for instance, the team should include a creative and a business profile. The main guidelines of the shareholders agreement can also be defined, when the cofounders start to finance the startup with their own money (The Boston Consulting Group, 2018).

IDEATION	
Business	• Validation of the idea • First Business Model
Team	• Complementary cofounders
Legal aspects	• Shareholders agreement
Finance	• Personal money

Creation

The creation of the startup comes as the second step of the process. At the business level, the idea must turn into a concrete offer. To reach this objective, a Minimum Viable Product, or MVP, must be created and tested with the first customers (The Boston Consulting Group, 2018). As the BCG explains, the MVP is the simplest version of the product or service, which presents the basic functionalities to satisfy customers. This product is essential to rapidly confront the market and collect customers' feedbacks which will help refine the offer and select the first commercial target to address (Salamzadeh & Kawamorita Kesim, 2015). At this stage, essential skills that will be needed for the development of the startup must be defined (The Boston Consulting Group, 2018). These skills can be either externalized or internalized, depending on the type of business and strategy of the startup. In the first

case, the cofounders should identify key partners but also mentors to constitute the first governance board. In the second case, new team members and interns are recruited. When it comes to legal requirements, the startup becomes a new venture with a legal structure. Sometimes, the intellectual property must be protected to secure the competitive advantage of the offer before it reaches the market. To finance all these developments, the cofounders can raise money among friends & family, and sometimes receive subventions from the government.

CREATION	
Business	• MVP
Team	• Key skills are identified and outsourced or internalized
Legal aspects	• Creation of the venture • Intellectual Property
Finance	• Friends & Family • Subventions

Seed

With the third stage, comes the famous "Proof of Concept" or PoC (The Boston Consulting Group, 2018). In other words, the moment when market traction can be assessed and possibly validated for the first time. If customers give positive feedbacks, the first prototype (MVP) can be enriched with new functionalities. Nonetheless, first feedbacks mostly lead to a pivot: the business model is changed and adapted, accordingly to customers' feedbacks (Ries, 2012). When the business model finally meets customers' needs and desires, first clients are capitalized and first key performance indicators (KPIs) can be evaluated, in order to refine customer acquisition and retention strategies. At this moment, to ensure rapid growth, startups usually need more money than their sole revenues (The Boston Consulting Group, 2018). The BCG explains that various ways exist to find this money: bank loans, public funding such as honor loans, fundraising, public or private investors, etc. Each possibility displays its own advantages and disadvantages: they must be carefully evaluated by the

entrepreneur, as well as the contract's terms and clauses. This fresh money enables the recruitment of key profiles in the startup teams: a sales director in a fashion brand for instance. Finding the right profile, with sufficient skills and a temper adapted to the cofounders is always a delicate issue.

SEED	
Business	• PoC • Iterations to find the right business model
Team	• Recruitment of key profiles
Legal aspects	• Creation of the venture • Intellectual Property
Finance	• Investors: public or private, Venture Capitals • Bank or honor loans • Fundraising

Scaling

The scaling phase is a hypergrowth phase: the revenues should dramatically increase in an addressable market of critical size (Cohan, 2019). Cohan depicts how this phase implies very difficult issues at every level of the startup: at the business level, the development strategy becomes crucial to gain new market shares ; the workforce must double or triple to address this growth in every way but recruiting simultaneously several talents and building up a real team at the same time is a very challenging task. Finally, hypergrowth implies a need for more funds which are usually found with a Series A investment, whose contract clauses are decisive for the startup's future (The Boston Consulting Group, 2018).

SCALING	
Business	• Industrialization, adaptation of the business model to a large market
Team	• Drastic increase of the work force
Legal aspects	• Respecting market regulations. Consulting a lawyer can be useful.
Finance	• Series A • Loans • Public funds

Expansion

The expansion is the last phase of the startup's life. At the end of this phase, the offer will address several markets or segments, at an international level. From the business point of view, new strategic markets must be wisely selected, and the product or service must be accordingly adapted (The Boston Consulting Group, 2018). This expansion also implies the optimization of the production and distribution, the automatization of processes, and a good human resources management.

EXPANSION	
Business	• Internationalization
Team	• Creation of an HR department to manage the workforce
Legal aspects	• Adaptation to new market regulations
Finance	• Series B • Loans • Public funds

This generic track can be applied to a large spectrum of startups. Nevertheless, some startups face specific challenges and express particular needs, due to the technology they develop or to the market they address. For instance, it is the case for deeptech startups (Bpifrance, 2019). The next section will focus on the specific needs of GreenTech startups, which were uncovered by prior studies.

2.2 Definition of GreenTech

Across countries and industries, a large spectrum of definitions for the term "GreenTech" exists. Because this word is broad and encompasses various technologies, the definitions do not describe the technology, but explain the outcomes of a "green technology".

The US National Science and Technology Council defines GreenTech as "a technology that advances sustainable development by 1) reducing risk, 2) enhancing cost effectiveness, 3) improving process efficiency, and 4) creating products and processes that are environmentally beneficial or benign" (Hoff, 2012). The definition given by the 2 co-authors of The *Clean Tech Revolution* is even more detailed and precise : "Clean technology comprises a diverse range of products and services, from solar power systems to hybrid electric vehicles (HEVs), that 1) Harness renewable materials and energy sources or reduce the use of natural resources by using them more efficiently and productively, 2) Cut or eliminate pollution and toxic wastes, 3) Deliver equal or superior performance compared with conventional offerings, 4) Provide investors, companies, and customers with the promise of increased returns, reduced costs, and lower prices, 5) Create quality jobs in management, production, and deployment" (Pernick & Wilder, 2007). The consulting group PwC more simply defines GreenTech as "technologies that are explicitly focused on reducing GHG emissions or addressing the impacts of global warming" (Herweijer & Azhar, 2020).

In this study, « GreenTech » refers to technologies and industrial services which optimize the consumption of natural resources, water, energy and raw materials. Greentech startups can thus be described as follow:

GreenTech startups apply technologies and industrial services which optimize the consumption of natural resources, water, energy and raw materials; while generating economic value and offering the same or better performances than existing technologies.

As previously explained, GreenTech covers several technologies which are usually classified into five to seven sectors. These sectors reveal the key challenge areas which contribute the most to climate change and have the worst environmental impact. The categorization chosen by Bpifrance to study GreenTech startups consists in 6 sectors given in Table 1.

Sector	Sub-sector
Energy	Renewable energies
	Nuclear energy
	Bioenergy
	Geothermic
	Hydrogen
	Network & distribution
	Storage
	Power engineering
	Self-consumption
Mobility & Transport	Electric
	Hydrogen
Agriculture & Agrifood	Processes & Production
	Decision Support Tool
	Robotics
	Biocontrol
	Food for health
	Animals, farming, aquaponics
Environment	Air: pollution, treatment, quality
	Water: pollution, treatment, quality
	Soils
	Waste: recycling, packaging, sorting, short route
	Eco conception
	Biodiversity
	Decarbonation
Green chemistry & Materials	Green chemistry
	Bio sourced materials
	White biotechnologies
	Cosmetic
Durable construction	Materials
	Wood production
	Constructive systems
	Equipment
	Digital

Table 1: Categorization of GreenTech into 6 sectors

2.3 Specific needs of GreenTech startups

As explained in the previous part, GreenTech refers to technologies which optimize the environmental transition. As the name *GreenTech* suggests, GT startups differentiate themselves from generic startups for two reasons:

- They rely on (new) *technologies,*
- They have a *positive impact on the environment*.

2.3.1 Deeptech startups needs

Because GT startups rely on new technologies, a non-negligible number of them can be categorized as *deeptech startups* (Bordeau, 2021). The adjective deeptech refers to technologies that can be defined as "disruptive solutions built around unique, protected or hard-to-reproduce technological or scientific advances" (de la Tour, Soussan, Harlé, & Chevalier, 2017). According, to a study conducted by the *Boston Consulting Group* in partnership with *Hello Tomorrow*, because deeptech startups rely on brand new technologies, they have to face their own challenges and therefore, have specific needs (2017).

To understand the needs of deeptech startups, it is crucial to have a complete idea of their specificities. Deeptech startups develop groundbreaking technologies and are characterized by four criteria (Boujo, 2019):

1) They have a link with the research ecosystem: they usually originate from public or private research laboratories or rely on a team with strong links to the scientific ecosystem (founders have a highly technical/scientific profile).
2) They must raise technological barriers: an innovative and complex technology makes it more difficult for competitors to reproduce the product or service, which is usually protected with patents.
3) The technologies offer a strong competitive advantage: it can be related to an innovative process which enables the startup to offer its products or services at a very competitive price. More simply, the advantage might be due to the development of a brand-new product with innovative features giving rise to the creation of a new market.

4) They have a long and complex go-to-market: the development, industrialization and commercialization take time, which implies a very capitalistic process until commercialization.

The most widespread tool adopted to follow the progression of a new technology is the Technology Readiness Level (TRL) scale, created by NASA in 1989 to manage the technological risks of its programs (Boujo, 2019). This scale, which is reproduced in Figure 3, determines the maturity level of a technology, from the emergence of the idea in a laboratory to the industrialization stage (Straub, 2015).

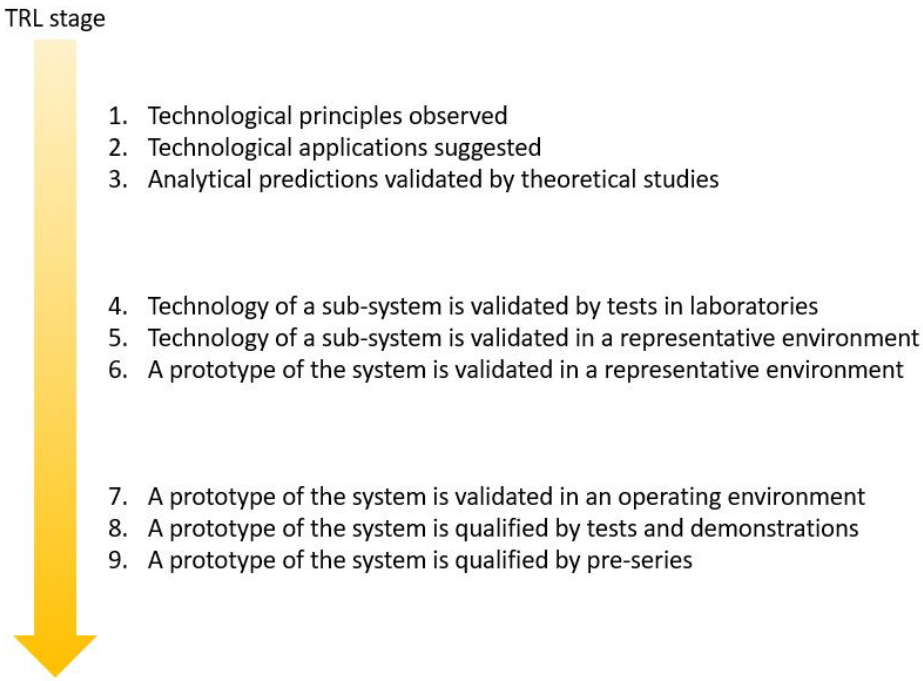

Figure 3: TRL scale

Bearing this scale in mind, it is easy to understand that deep tech startups face a specific challenge compared to other startups: bringing a new technology to the market. Consequently, at each stage of the startup development previously described (Ideation, Creation, Seed, Scaling, Expansion), they need precise support to overcome this challenge. In other words, they need **technological expertise** (de la Tour, Soussan, Harlé, & Chevalier, 2017). These needs are illustrated by the TRL scale which can be

introduced in the startup development steps as follow: TRL 1,2,3 are prior to Ideation, TRL 4,5,6 happen between Ideation and Creation, TRL 7,8,9 are overcome between Creation and Seed (Bpifrance, 2019).

Alongside the technological needs deeptech startups have during the whole development process, they have other specific needs related to their highly technological character (de la Tour, Soussan, Harlé, & Chevalier, 2017). Bringing a new technology to the market also requires some adjustment along the startup development process in each grand category of needs that were identified (Business, Team, Legal aspects and Finance).

Business

When it comes to business, the challenge faced by a deeptech startup is twofold. First, the technology developed might not be launched on the marker straight away, either because the market is not mature enough, or because no application exists for this new technology (de la Tour, Soussan, Harlé, & Chevalier, 2017). In that case, **the "technology push" strategy** needs to be applied (Nam & Tatum, 1992). Then, an **extensive and continuous technological watch** is required in order to remain ahead of other competitors (Bpifrance, 2019).

Team

In a deeptech startup team, the first founder is usually a researcher, or a person related to a highly technological or scientific network. Therefore, the **need to find a cofounder** is even higher than in other startups because this initial founder usually lacks business expertise (Bpifrance, 2019).

Legal aspects

For a deeptech startup, the legal aspects are much more important, especially the **Intellectual Property questions**. It is crucial to protect the innovation with licenses or patents in order to preserve the competitive advantage (Mines Paristech, 2012), and it is thus impossible to address these aspects without a lawyer.

Finance

The development process of a deeptech startup is long, complex and therefore **highly capitalistic**: “60% of deeptech startups [identify] funding as their most critical resource and 80% ranked it in their top 3”. (de la Tour, Soussan, Harlé, & Chevalier, 2017). The high costs are indeed not only due to the long period of time before reaching rentability, they are also explained by the very expensive infrastructures needed: unlike startups developing a simple platform, deeptech startups need costly equipment, hardware, machines, to test and prototype their product/service.

Like other startups, it is important to identify the right financial resources at the right time, but deeptech startups have higher expectations in terms of:

- **Subventions**: at early stages, deeptech startups rely a lot on subventions because the time to market is still too long for investors to find an interest. In France, a lot of money (around 10Mds€ each year) is dedicated to innovation (Bpifrance, 2019): Research Tax Credit, subventions allocated by Bpifrance, etc. Additionally, subventions are sometimes an opportunity for deeptech startups to gain visibility, with innovative competitions awarding the best innovations for instance. These competitions are also a way to prepare the market and customers to the disruptive innovations (Bpifrance, 2019).
- **Finding the right investors**. It is important to find the investors whose investment strategy is suitable with the deeptech sector: with momentous challenges in terms of regulations and industrialization, very high investments are required to obtain Return on Investment (ROI), and with a long-term approach.

2.3.2 Challenges and needs of startups addressing environmental problems

According to some studies, GT startups have their own challenges and issues, that deeptech startups may not have, or in a less significant way (Herweijer & Azhar, 2020).

Financial needs

The first challenge identified in all the articles which evaluate GT startups needs is related to the difficulty of finding enough money, at the right time. According to Herweijer & Azhar, “finance is the key and ongoing challenge” for climate-tech startups (2020).

The reason for this difficulty to find investors, is found in the development process of enviro-tech startups. Such startups are highly capitalistic, much more than other industries, and when ten million euros can be more than enough for a lot of startups, most GT startups need up to 10 or 20 times more money to succeed (Baltes & Büchele, 2015). Green technologies require indeed a lot of money and a lot of time to be developed, from the early stages of research and development (Herweijer & Azhar, 2020), until the industrial and scale-up phase (Silverberg, 2015).

Therefore, the usual investment actors (Venture Capitals and investment funds) are not adapted to climate tech startups and “the right kind of capital is missing” to address their needs. (Ott, Wadsack, Ihly, & Cozart, 2021). Indeed, because R&D takes time, return investment takes time as well : GT startups will not scale up rapidly and thus, the time before exit will be extremely long for investors who do not have the patience to wait (Baltes & Büchele, 2015). Venture Capitals (VCs) expect high return on investment (Ott, Wadsack, Ihly, & Cozart, 2021) so they prefer to invest in software or IT startups which will have a higher and quicker return on investment than GT startups: they present lower risks because they need a little amount of money to scale up in a very short time (Hao, 2018). Moreover, because enviro tech startups need a lot of money, those “return oriented players” know that such startups will need more money later, and not only the first time they contact VCs (Baltes & Büchele, 2015). For one euro invested, they know they will have to invest two or three euros later, and they usually cannot afford it.

At the beginning of the 21st century, because of the suddenly keen interest from the media and VCs for climate tech startups, some investors invested huge amounts of money in GT startups and tried to make them scale up rapidly. Consequently, a lot of startups died between 2005 and 2010, even those who were supported by public investment funds and despite all the money they raised (Silverberg, 2015). For

instance, the Californian startup Solyndra developed a solar energy solution in the early 2000s and raised 700 million dollars. However, the startup did not pass the industrial phase, because the founders and investors did not take the time to evaluate the industrial and financial viability of the model and did not have the time to pivot before it was too late. So, the startup filed for bankruptcy in 2013 (Silverberg, 2015). Silverberg explains that Better Place, a startup who developed a network of "battery swapping stations for electric vehicles" and raised 850 million dollars experienced the same end, as well as other GT startups at the same time (2015).

Baltes & Büchele evaluated the investment ecosystem in Baden Württemberg in Germany and identified two other factors which are restraining investors from dealing with GT startups (2015). First, beyond their long and capitalistic development, climate tech startups are also risky for investors because they rarely have an entire confidence in the founders of the startups who are sometimes too much "research oriented" and not enough "business oriented". An investment in those startups will be risky for them because they do not have the same point of view, which is not suitable. The second factor the researcher identified, is the inconsistency of regulations: they might change during the long R&D process of the startup which would not be able to address the market anymore.

For all these reasons – a long and capitalistic development, fast changing regulations, atypical founders' profiles; only a few actors invest in GT startups and the "investment climate tech ecosystem is nascent" (Herweijer & Azhar, 2020). In Israel, the capital invested in GreenTech startups only represented 5% of the total investment capital (Hao, 2018). In Germany, only 2.4% of early-stage investments were dedicated to the cleantech sector in 2015 whereas GT startups represented 13.6% of all startups in the country, thus the "early stage venture capital market for GreenTech companies is yet underdeveloped" (Baltes & Büchele, 2015). Moreover, investors invest mostly once or twice in GreenTech startup: so, most of them do not develop the expertise that is expected from them and that would be obtained by investing regularly in GT startups (Herweijer & Azhar, 2020).

Business Angels could be the right investors for GT startups, because they usually have a certain interest in a specific field and possess a good network, they can activate

to help the startup (Baltes & Büchele, 2015). When acting alone, they do not bring much money, but if they add up together, they can invest larger amounts of money than VCs. The problem is that it is very difficult for a startup to identify Business Angels who remain silent and incognito. Finding the ones who will match the startup is a "time consuming" and "costly" effort, which is not always rewarded (Baltes & Büchele, 2015).

Of course, other sources of funding exist, and startups can find financial support with public grants and subventions (Ott, Wadsack, Ihly, & Cozart, 2021). Some EU-SME programs exist to finance specific needs of GT startups, but the money brought by public funds will not be enough for most of them (Baltes & Büchele, 2015).

The need to develop a green technology expertise

Like deeptech startups, because of their technologic character, GT startups have a higher need for infrastructures and expensive equipment than any other startups, and an intensive coaching of the GT founders is often required because they usually have excellent scientific competencies but no entrepreneurial experience (Ott, Wadsack, Ihly, & Cozart, 2021). But GT startups face two other challenges that deeptech startups might not always confront.

The first one is related to regulations. Because climate change, pollution and biodiversity are becoming increasingly important in the governments' policies, regulations in this sector also evolve continuously (Herweijer & Azhar, 2020). However, a study from Pwc revealed that all these regulations are rarely adapted for the rapid growth of GreenTech startups (2020). Sometimes, the regulations do not evolve quickly enough, which prevent startups from selling their product/service despite all the benefits they could bring in the environmental transition. Old regulations can indeed be prohibitive: they are not adapted to the reality anymore and not adapted for new emerging technologies. The study also explained that regulations vary a lot between countries, and the absence of homogeneous regulations between countries makes it even harder for startups to scale up and expand internationally. In the United States, regulations even differ from one state to the other. If all deeptech startups have to overcome strict regulations which are not adapted to new technologies, it appears that this problem is aggravated for GT startups because governments do not

necessarily have the expertise to understand which technologies could be benefic for the environment (Herweijer & Azhar, 2020).

The other one is linked to the technology developed by GT startups. These new technologies developed are usually extremely complex to industrialize. Cleantech startups face challenges scaling up because they face problems that could not be identified earlier since the technology is still new and quite unknown (Hao, 2018). This "lack of technology knowledge in the cleantech sector" and the uncertainty of the new technologies force startup founders to be patient, scale up step by step and not to quickly in order to be able to adapt and change if their solution turns out to be economically or technologically non-viable (Silverberg, 2015). Here, it is crucial to underline the fact that, if some studies identify this challenge as a specificity of GreenTech startups, it seems that deeptech startups – that is, startups developing new technologies which are not necessarily dedicated to the environmental transition; actually, all have to tackle this issue (Boujo, 2019).

The need for a strong and supportive ecosystem

Global warming, climate change, are affecting everybody. But the efforts required from individuals and industries to make things change, to initiate an energetic transition can be extremely demanding and intense. The environmental transition involves sacrifices from people and companies, who are usually not eager and/or not ready to make. Therefore, governmental and educational institutions have an immense role of influence to play (Hoff, 2012). Incentives from governments must force companies to initiate their energetic transition, and support from governments and educational institutions must help GreenTech startups and other green initiatives from all companies access the market to offer new, and more durable solutions (Herweijer & Azhar, 2020).

The role of the government is key to promote green technologies and to create a sustainable GreenTech ecosystem (Hao, 2018). And a strong and supportive ecosystem is crucial to allow GT startups to grow and flourish, especially because the knowledge in green technologies is still under construction while the emergency to take action and act for climate is growing stronger (Hoff, 2012). An Italian study demonstrated that environmental awareness as well as scientific and technological

knowledge in the GreenTech sector are needed in a given geographical area in order to see climate tech startups appear in this particular area (Giduici, Guerini, & Rossi-Lamastra, 2019). Büchele & Baltes also explained the importance to build GreenTech clusters to foster the creation of GT startups, like the LA Cleantech Incubator in California which provides funding, working space, scientific expertise, equipment, and business support in the same place (2015). And this ecosystem should start from the universities, which have a crucial role to play: GreenTech programs in schools and universities should encourage entrepreneurship and offer to students the possibility to receive the adequate formation in order to be able bring to the market their innovative ideas (Baltes & Büchele, 2015).

The characteristics, and the ways to create the most effective entrepreneurial ecosystems, according to literature, are developed in the next chapter.

3. Entrepreneurial GreenTech Ecosystem

3.1 Entrepreneurial Ecosystems

3.1.1 Entrepreneurial Ecosystem concept

The concept of EE appeared in the 1980s and 1990s when scholars abandoned their research on the relation between the personality of an entrepreneur (Schumpeter, 1934) and the success of a new venture, to work on the networks and structures supporting entrepreneurship (Dodd & Anderson, 2007). The popularity of EE increased with the work of Daniel Isenberg (Isenberg, 2010) in the Harvard Business Review, who insisted on the crucial role of a strong ecosystem made of diverse actors to support the creation and growth of successful startups (Harrison & Spigel, 2017).

Spigel defines an ecosystem as "the union of localized outlooks, social networks, investment capital, universities and active economics policies that create environments supportive of innovation-based ventures" (Spigel, 2017). According to him, it is impossible to transform entrepreneurial innovation into a solid economy without an ecosystem.

EE recently became an interesting tool to understand how to encourage and foster the creation of new ventures (Harrison & Spigel, 2017). However, "Research on ecosystems is underdeveloped and under-theorized" (Spigel, 2017), which makes it difficult for governments and policy makers to make the right choices in a given ecosystem (Harrison & Spigel, 2017). Usually, research on EE gives very precise recommendations in terms of culture, economy, policy, but do not explain how these elements are all interrelated (Motoyama & Watkins, 2014). Consequently, a lot of governments merely import successful models they acknowledge in other countries without considering the economic and cultural background which are also responsible for this success (Spigel, 2017).

3.1.2 Features of an Entrepreneurial Ecosystem

Spigel identifies 10 attributes of EE, which support the creation and success of new ventures, although the presence of all these 10 elements is not necessary to build a successful EE (Spigel, 2017).

- 2 cultural attributes:
    - "Cultural attitudes" which define who and how an entrepreneur should be,
    - Histories of successful entrepreneurs and new ventures, which must be used to inspire new entrepreneurs and students.
- 4 social attributes:
    - A very dense network to support entrepreneurship with market and technical knowledge, but also investors, customers and suppliers. Connections to other networks is also crucial to gain new knowledge regularly.
    - Investors whose money but also experience will help support new ventures.
    - "Mentors and dealmakers" who are essential to foster the growth of startups by establishing relations between actors and advising entrepreneurs.
    - Skilled workers with technical and/or managerial knowledge who do not fear the uncertainty of entrepreneurship and are able to adapt rapidly.
- 4 material attributes:
    - Universities who can provide knowledge to new ventures through research license or other collaborations, and who must educate students to entrepreneurship (Wolfe, 2005).
    - Support services such as human resources experts, patent advisors, lawyer; and support firms like incubators, accelerators have an essential role in this ecosystem, although their effectiveness is not always demonstrated (Tamasy, 2007)

- Policies and governance who can facilitate the creation of new ventures through the creation of publicly funded programs (incubation, support services, etc.) or by reducing bureaucracy for entrepreneurs (Huggins & Williams, 2011).
- The presence of "strong local markets" with customers having specific needs to which the new startups can answer. Entrepreneurs are indeed in more direct contact with the customers and thus, understand their needs better.

The relationships between all these attributes is as much important as the attributes themselves (Spigel, 2017). For instance, without the cooperation of existing programs, policies cannot push the creation of new ventures, and programs cannot be efficient without the appropriate cultural attitudes.

Stam also adds that entrepreneurs are a crucial part of this ecosystem as well (Stam, 2015). According to him, their existence is not solely a result or a consequence of an entrepreneurial ecosystem. Entrepreneurs have a key role in Ees because they challenge them and keep them "healthy".

3.2 Actors of the GreenTech ecosystem in France

In France, five to six actors can be identified as the main actors of the entrepreneurial ecosystem: SATTs, TTOs, Carnot Institutes, Incubators, Competitive poles and Technopoles (Agence Nest, 2020). Thus, they are also essential actors for the GreenTech ecosystem.

ITEs (Institutes for the Energetic Transition) were created by the French government in 2010: they are interdisciplinary centers specialized in renewable energies. Their role is to bring together research and industrial competencies to strengthen the ecosystem of Competitive poles in the energy sector (Gouvernement Français, 2021).

The roles of all these actors are given in the following table.

Actor	Role
Carnot Institute	Public research structure, regrouping various laboratories and scientific platforms
SATT	Private organism which helps to transfer technologies from various laboratories to the market
TTO	Public organism which helps to transfer technologies from its laboratories to the market
ITE	Regroups companies and laboratories, working on the energetic transition
Incubator	Supports startups business growth
Competitive Pole and Technopole	Regroups companies and laboratories, working on the same topic

Table 2: Main actors of the GreenTech ecosystem in France

It can be interesting to observe the geographical repartition of incubators and competitive poles which have a GreenTech specialization (among the six sectors detailed in the chapter 2 of this study: Mobility, Environment, Energy, Agriculture & Agrifood, Green Chemistry and Durable materials, Durable construction).

There are forty-three incubators with a GreenTech specialization in France, and more than a half is located in the area of Paris, the capital of the country (Dulin, 2021). Four other regions have a quite significant number of incubators, but all others only have one or two Greentech incubator. This repartition, depicted in the next Figure, reveals the disparities of the Entrepreneurial Greentech Ecosystem in France.

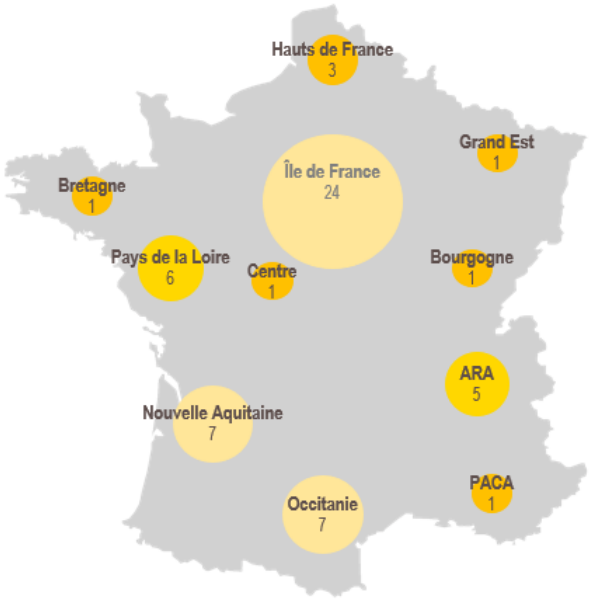

Figure 4: Geographical repartition of GreenTech Incubators in France

On the contrary, competitive poles and technopoles which could be labeled as GreenTech are only found in regions of France, but not in the capital, as illustrated in Figure 5.

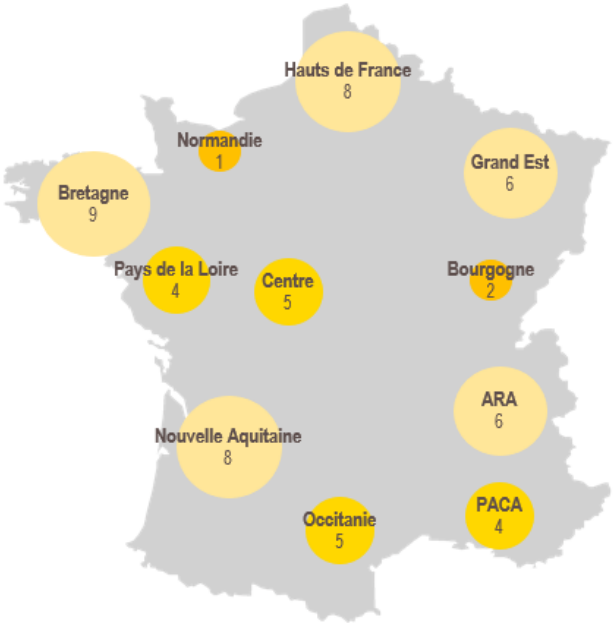

Figure 5: Geographical repartition of GreenTech Technopoles and Competitive Poles in France

3.2.1 *Emergence of GreenTech startups*

Since the early 2000s, the popularity of the GreenTech sector in France has known distinct highs and lows, like everywhere else in the world (Laurent, 2017). After a keen interest from Venture Capital (VC) firms from 2006, funding in the sector as well as the creation of cleantech startups dropped until 2015 (Gaddy, Sivaram, & O'Sullivan, 2016), when the Paris Agreement gave a new momentum to the sector (United Nations Climate Change, 2016).

The year 2015 was indeed a positive turning point for the greentech sector: the European Investment Bank (EIB) committed to loan 20 billion euros per year until 2020, in order to finance projects acting against climate change (Laurent, 2017) and the Paris Agreement gave incentives for technology transfer. In France, commitments to fight against climate change grew stronger as well. In August 2015, the government published a new law which gave precise objectives and means to reduce waste, energy consumption and greenhouse gases emissions (République Française, 2015). In February 2016, the French Ministry of ecology launched the "GreenTech Verte" initiative which was later renamed "GreenTech Innovation", and started building an ecosystem to support GreenTech startups, with partnerships from incubators and laboratories (Ministère de la transition écologique et solidaire, 2017). Along with this initiative, an official GreenTech label was created. This label identifies the most promising startup projects in terms of innovation and environmental impact, and gives access to a large panel of services including incubation, formation, networking, etc. Today, 172 startups possess the GreenTech label (Ministère de la transition écologique et solidaire, 2021).

3.2.2 *Today*

According to a study recently conducted by Bpifrance, today in France, 7% of startups can be classified as GreenTech and belong to one of the GreenTech sector described in Table 1 (Bordeau, 2021). Moreover, the same study shows that whereas the energy sector represented 43% of the GreenTech startups in 2011, this number dropped to 30% in 2020, revealing a growing diversity of GreenTech startups and their sectors of application, which is depicted in Figure 6. However, the environment and energy sectors combined represent almost 50% of the GreenTech startups.

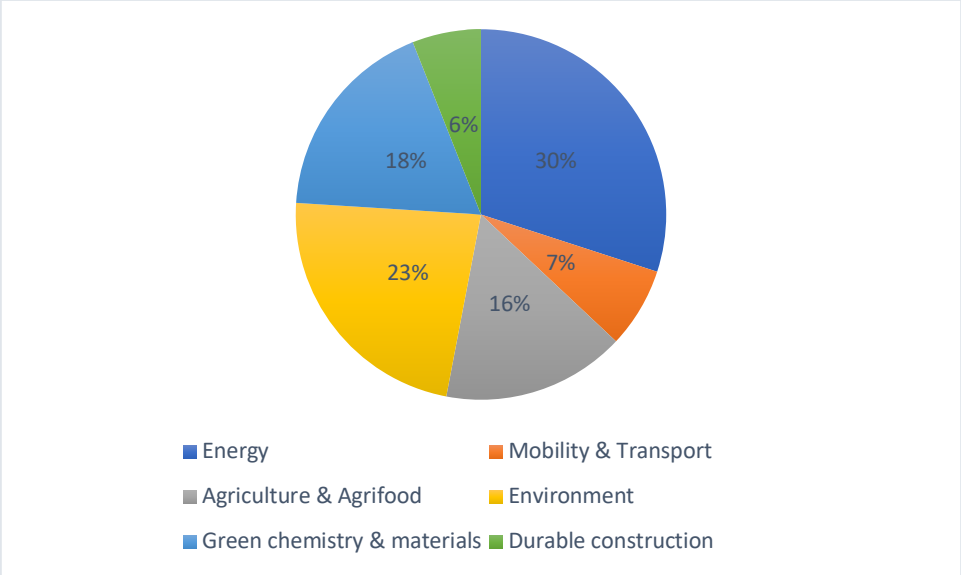

Figure 6: GreenTech startups in France and their sectors

If the capital region appears to host the greatest number of GreenTech startups, only 22% of the GreenTech startups are located in Paris (Bordeau, 2021). Figure 7 shows the repartition of GreenTech startups in the regions of France and gives some examples of GreenTech startups. Additionaly, Bordeau underlines that all the regions in France are very dynamic when it comes to the GreenTech sector, and states that no region developed a specific expertise in one of the GreenTech sectors.

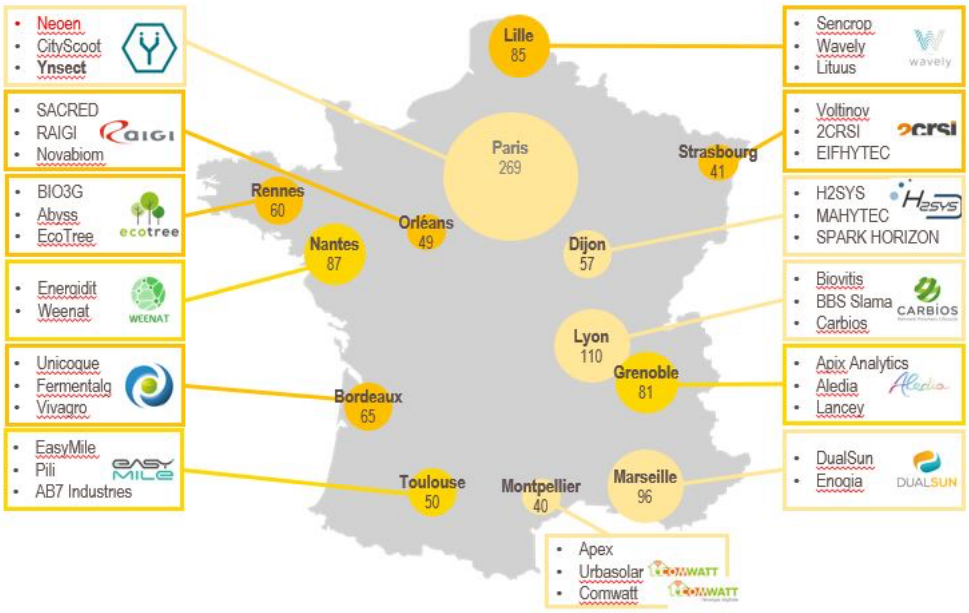

Figure 7: Geographical repartition of GreenTech startups in France

Finally, in 2021, GreenTech startups represent 12% of the French Tech 120 program (Bordeau, 2021). The French Tech 120 selects the most promising French startups which already reached a relatively high maturity stage. They are selected based on several financial criteria such as their revenues or their fundraising, by Bpifrance and the government (La French Tech, 2021). By integrating this program, startups get support for one year, to access different services and gain more visibility. The higher proportion of GT startups belonging to the French Tech 120 compared to the proportion of GT startups in France, demonstrates a certain ambition from the French government, to increase its support to GT startups.

The recent enthusiasm for GreenTech startups and the solutions they could bring to face climate change, led the French government and Bpifrance to support them more specifically. As previously explained, GreenTech startups develop technologies which optimize the consumption of natural resources while generating economic value. Like any other startups, they face challenges and must be supported by several actors throughout their development, from their creation to their expansion and/or internationalization, in order to have better chances to thrive. These actors are part of an entrepreneurial ecosystem, which is efficient if a sufficiently wide variety of actors who interact with each other exist, and if the cultural and economic backgrounds of

the country are suitable to such ecosystems. Some studies tried to study specific needs of GreenTech startups. But the literature review highlighted how the “specific” needs identified by several studies are very close to deeptech startups needs. However, several actors of the French GreenTech entrepreneurial ecosystem can be labeled as “GreenTech” actors, but the wide variety of these actors does not mean that they cover efficiently GreenTech startups needs. Consequently, Chapter 4 and Chapter 5 of this study will aim at identifying more precisely specific GreenTech startups needs and will evaluate the support of GreenTech actors to GreenTech startups.

4. Methodology

4.1 Research Approach

After only two months working with GreenTech startups, it became rapidly evident that the GT ecosystem was very opaque to them. On the one hand, they had no clear idea of which actors were existing in the ecosystem and which one to choose at each stage of startup development. It seemed that the plurality of actors, instead of helping them, was so confusing that they struggled to find the right actor which could be able to address their needs. Many startups start to work with one specific actor they find, and then discover other actors thanks to the first ones or by chance. Sometimes, they are lucky enough to find the right actor at the right time. But sometimes, they never find the most appropriate ones, or when they do it is too late, usually because they are too old and not eligible anymore. Moreover, some startups, who spend hours trying to find the right actor through personal research on the internet, then realize that the services offered were not the ones they expected. In other words, the services offered by each actor in the GreenTech ecosystem are far from being clear. On the other hand, it is also extremely difficult for GreenTech actors to properly address GT startups needs if they are not aware of these specific needs – if GT startups do have particular needs as opposed to "regular" startups.

These two observations justify the choice of a "field survey" as a research method, which was conducted to understand 1) specific needs of GT startups; and 2) the exact services offered by GT actors. A qualitative research is indeed much more appropriate than a quantitative research in order to have a deep understanding of what *is existing* and what *should exist* to answer GT startups' needs. This research study does not aim at measuring statistical hypotheses but was designed to explore the GT ecosystem in France. As a consequence, GT startups and GT actors were interviewed.

A large panel of different types of investigation exists to conduct qualitative interviews. According to Choi, in his book The SAGE Handbook of Qualitative Data Collection, there are three large categories of interviews (Choi, 2018):

- Extremely structured interviews, where questions are asked in a very specific order. In that case, the interviewee has no chance to deeply expose its views and opinions. However, the answer to each question is easily obtained.
- Semi-structured interviews. In that case, the topic and the questions are prepared by the interviewer and the interviewee guides partly the discussion. The interviewer draws on the answers given and redirect the questions and conversation when necessary.
- Unstructured interviews which look like an everyday conversation, led by the interviewee. The interviewer only choses the topic and the interviewee guide the discussion.

As Flick (1998) explains, it can be extremely hard to interview people who have an expertise in a specific field. Short and precise questions lead to a restrictive conversation with very few possibilities to obtain new insights. On the contrary, giving to interviewees the possibility to express more largely their point of views, can be useful to get more detailed information (Flick, 1998).

The semi-directive approach was thus used in order to get exclusive insights while obtaining the information needed to answer the research questions of this study. In order not to lose the control of the interviews, an interview guide was prepared, following the CIMO logic. This research design enables to obtain results which are then relevant for practice, by describing "what to do [Intervention], in which situation [Context], to produce what effects [Outcome] and offer some understanding of why this happens [Mechanisms]" (Denyer, Transfield, & Van Aken, 2008, p. 396).

Lastly, the inductive research strategy was chosen to conduct this study, as opposed to a deductive research method, which are built on existing theories. The deductive approach could have been used, in order to verify the several specific needs of GT startups that were found, but the literature was not explicit or clear enough to have a precise idea of these specific needs. On the contrary, the inductive methodology allows to explore relatively new topics (Eisenhardt, 1989) and to examine new findings by analyzing specific cases (Flick, 1998).

4.2 Data Collection

4.2.1 Data collection of literature

The present study was commissioned by Bpifrance, wishing to better understand the French GT ecosystem, its strengths and its weaknesses, and to identify some levers she could work on, in order to improve the support to GT startups which might have, according to her, some specific needs.

To conduct this study, it was thus essential to first have a clear understanding of the development process of any "normal" startup and of their needs, but also to examine existing literature about potential specific GT startups needs. Since GT startups needs have not received much attention from prior academic literature, it became clear that this study should aim at identifying the existence or the absence of specific needs for GT startups. Second, to detect margins of improvement for the French GT ecosystem it was also crucial to appreciate the characteristics of an entrepreneurial ecosystem and to discern the various French GT actors as well as their theoretical roles. The literature review, from Chapter 2 to Chapter 4 of this study, serves these two prerequisites.

The literature review could be conducted thanks to the aggregation of various sources: academic papers were found through multiple databases such as Google Scholar and JSTOR and thanks to the recommendations from advisors and supervisors of this thesis. More general information about GT actors state of the art of the GT ecosystem in France were obtained on specific websites, including official government website and landing pages of GT actors. Academic papers and other documents were collected thanks to keywords related to this study and were analyzed if the title and abstract matched the subject of this thesis. This search for literature was conducted until a point when newly found article did not bring new information anymore.

4.2.2 Primary data collection

In this thesis, primary data was mainly collected through the interviews of 2 broad categories of interviewees: GT startups and GT actors. As explained previously, this data collection was operated through semi-structured interviews, based on an interview guide which followed the CIMO logic (Denyer, Transfield, & Van Aken, 2008). All

the interviews were conducted online, via Microsoft Teams, because of the sanitary situation in France and the restrictions imposed by the government. The average duration of each interview was of 30 minutes. The interviewees were not recorded during the discussions, to ensure confidence and freedom of expression. Thus, primary data analysis relied on the notes taken during the interview, and not on transcripts. Following Eisenhardt recommendations (Eisenhardt, 1989), the primary data was completed by startups and actors' presentations, and other kinds of reports which provided useful resources.

Interviews of GT startups

A team of experts at Bpifrance was working on the identification and definition of GT startups specific needs. In order to avoid executing the same work twice, and to avoid soliciting the same startups several times, the notes of the interviews which were already conducted, were used to collect the information needed for this study. As Bpifrance finances and supports a consequent number of startups, it was easy to interview their CEOs.

Name	Role	Topic	Field(s)
Startup 1	CEO	Alternative proteins	Agriculture & Agrifood
Startup 2	CEO	Proteins from insects	Agriculture & Agrifood
Startup 3	CEO	Alternative proteins	Agriculture & Agrifood
Startup 4	CEO	Synthetized meat	Agriculture & Agrifood
Startup 5	CEO	Synthetized meat	Agriculture & Agrifood
Startup 6	CEO	Proteins from algae	Agriculture & Agrifood
Startup 7	CEO	Hydrogen technology	Energy

Table 3: List of Interviewees (GT startups)

Interviews of GT actors

Prior to interviewing GT actors, two tasks had to be conducted. The first one consisted in identifying all the existing GT actors in whole France. To do so, for each of the 7 types of actors in the entrepreneurial ecosystem identified in the literature review (OTT, SATT, Carnot Institutes, Incubators, Competitive Poles, Technopoles, ITE), the names of all the actors were collected thanks to research on the Internet. This task was facilitated by the fact that each type of actors has a dedicated website where the whole network can be found. Then, only actors who indicated that they provided services identified as GT services, were selected. More than 200 GT actors were identified. The second task is related to sampling. Usually, in qualitative research, purposeful sampling is applied to select the right candidates (Patton, 2002). Among the different existing strategies for purposeful sampling, criterion sampling (Palinkas, et al., 2015) was more specifically chosen. The following criteria were thus applied:

1) Several types of actors should be represented
2) Different types of GT fields or categories (identified in the literature review) should be represented
3) The actor has several years of experience in working with startups

Those criteria ensured the collection of rich and relevant information, from various actors and categories, and enabled to avoid having biased knowledge. Most representatives were identified by several experts working at Bpifrance, with substantial knowledge about the different types of actors, and with a consequent professional network. Some were also contacted thanks to previous professional experiences at Bpifrance. Therefore, all the interviewees were contacted through a mutual contact, which enabled a rapid agreement from them to take part in the study. In total, 12 actors could be interviewed, from 6 different types of actors and with various specialty fields. Besides, on interview was conducted with the head of the technological poles network, which was of great help to have an overview of such actors. The list of interviewees can be consulted in Table 4. All of them were interviewed between April and May 2021.

Name	Role	Type of actor	Field(s)
Incubator 1	Head of Incubation Program	Incubator	Environment, Mobility, Durable construction
Incubator 2	Head of Innovation and Development	Incubator	Environment, Energy
TTO 1	Head of startup partnerships	TTO	Green chemistry & Bio sourced materials
TTO 2	Head of technology transfer	TTO	Multi-sectors
Carnot 1	Director	Carnot Institute	Agriculture & Agrifood
Carnot 2	Director	Carnot Institute	Agriculture & Agrifood
Carnot 3	Head of partnerships	Carnot Institute	Agriculture & Agrifood
Competitive Pole 1	Director	Competitive Pole	Durable construction
Competitive Pole 2	Head of International	Competitive Pole	Environment
Technological Pole 1	Head of Marketing	Technological Pole	Durable construction
Technological Pole 2	Director	Technological poles network	Multi-sectors
SATT	Industrial Partnerships Director	SATT	Multi-sectors

Table 4: List of Interviewees (GT actors)

As shown in Table 3, all startups interviewed – except one, can be classified in the field "Agriculture & Agrifood". On the contrary, as explained in Table 4, GreenTech

actors belong to various GreenTech categories, and only the “Carnots” interviewed were in the agriculture sector. Therefore, the findings and results of the study cannot be representative of all GreenTech startups nor of the whole GreenTech ecosystem in France.

4.3 Data Analysis

To analyze data, the Gioia methodology was used (Gioia, Corley, & Hamilton, 2013). The data analysis started when the first interviews were conducted as Langley recommends (Langley, 1999). The codes and categories, that are later used for data analysis, usually appear with the first interviews and it is thus essential to work on both interviews and data at the same time (Langley, 1999). To execute first order coding, all the seemingly interesting themes extracted from primary data were dutifully noted, as the Gioia methodology suggests (Gioia, Corley, & Hamilton, 2013). The number of first order categories was then reduced by identifying redundancies.

After the first order analysis, the terms were further regrouped to obtain more abstract second order themes. This second order analysis was conducted by identifying new understandings and information compared to the existing literature, or confirmations of the results of prior studies (Gioia, Corley, & Hamilton, 2013). Second order themes were then aggregate together to obtain third order concepts.

The data structure established from first order concepts, second order themes and aggregate dimensions can be consulted in Figure 8 and Figure 9, in order to understand how second and third order categories were deduced from raw data. This data structure also shows the precision of qualitative analysis (Pratt, 2008).

Two types of actors were interviewed: startups and supporting actors in the French GT ecosystem. Thus, needs of GT startups and offerings of GT actors could be assessed, and possible lacks in the French GT ecosystem and/or discrepancies were identified. The interviews of these two broad categories of actors also gave a chance to have a complete understanding of this ecosystem while limiting biased interpretations, thanks to the confrontation of two different point of views.

Interviews of GT startups enabled to evaluate their position in the GT ecosystem and to understand their opinion about this ecosystem. The data collected among startups were organized according to these two guidelines, and the data structure related to these interviews can be consulted in Figure 8.

First Order Concepts	Second Order Themes	Aggregate Dimensions
- Being guided by actors - Finding partners and customers - Discussing with other startups	Interacting with the whole ecosystem	GT startups want to be part of a complete and clearer ecosystem
- R&D is crucial for GT startups - Intellectual Property is a conflictual topic - GT startups need infrastructures along the whole development process - Infrastructures are difficult to find	Getting the right support in the R&D phase	
- Regulations are obstacles to the development - Differences of regulations between countries - Suspicion from customers	Overcoming regulations and prejudices	GT startups face specific challenges
- Need for a lot of money - Importance of non-dilutive money	Finding the right funding at the right time	

Figure 8: Data structure (GreenTech startups)

Discussing with GT actors, it was then possible to assess their understanding of the GT ecosystem and to identify the various services they can offer to GT startups. Data structure for this category of actors is depicted in Figure 9.

First Order Concepts	Second Order Themes	Aggregate Dimensions
- Definition of GreenTech - GT startups are not so different from other startups - GT startups are considered as "like other companies" by some actors	GreenTech startups definition	How GT actors perceive GT startups
- GT actors do not evaluate their support to GT startups - Support to GT startups is a recent activity	Importance of GT startups for GT actors	
- Regulations - Market acceptability - Funding	GreenTech startups needs from actor's perspective	
- Developing key partnerships - Business support programs	Business support	GT actors' services
- Establishing connections with laboratories - TTOs and Carnot Institutes offer a clear scientific support	Scientific support	
- Establishing the right connections with investors	Financial support	
- Opacity of the GT ecosystem - Every actor stands as a reference in the GT ecosystem - Each actor has its own strategy to support GT startups	Unclear GreenTech ecosystem	The French GT ecosystem still under construction
- Collaboration inside a category of actors - Few collaborations between GT actors - A collaboration between GT actors not considered as essential	A limited collaboration between GT actors	

- The GreenTech Innovation Network has a limited role		

Figure 9: Data structure (GreenTech actors)

Following indications of the Gioia methodology, the interviews were conducted in parallel with the redaction of literature review, so that hypotheses from prior studies would not influence nor skew data analysis (Gioia, Corley, & Hamilton, 2013). Therefore, findings were linked to literature review after the completion of interviews.

5. Findings

5.1 GT startups want to be part of a complete and clearer ecosystem

5.1.1 Interacting with the whole ecosystem

Founders of GT startups require help from various actors, in order to find their place in the ecosystem. First, **they need to be guided by actors who have a clear vision of the global ecosystem** and who will be able to provide them with the right tools, scientific and business expertise, and partners.

> We need a much more structured support than the one offered by the SATT. We need a program with different stages and phases to be stimulated. [Startup 7]

> We had access to equipment, funding, expertise and business formation at the same place and at the same time, it was really helpful. [Startup 4]

> You have to find the right partners, the right mentors and incubators and/or accelerators. [Startup 2]

> If you cannot benefit from French scientific ecosystem and expertise, it is a real problem. [Startup 4]

These actors are especially useful **to find industrial partners and customers, who are crucial for the right development of the startup.**

> Our first Proof of Concept was done with potential customers that were identified by our incubator, who then put us in contact with them. [Startup 3]

> We need help to identify and work with potential industrial partners, who would like to develop products and whom we could help with our innovation. [Startup 5]

> It is crucial to find industrial partners, but also very difficult. We need help to identify the right ones, and to be put in relation with them. [Startup 7]

Finally, all the GT startups interviewed also evoked **the importance to be able to exchange with other startups**, with peers who experience or have experienced the same issues, in order to learn from each other.

> We have some contacts with other startups, but it could be interesting to be in contact with other complementary and/or bigger companies, to learn even more. [Startup 1]
>
> We are in contact with other startups from the GT ecosystem. [Startup 6]
>
> It is useful and interesting to work with other startups of the same field (…) sometimes what is missing is having some inputs from entrepreneurs, who would share their experience and recommendations. [Startup 4]

5.1.2 Getting the right support in the R&D phase

All the CEOs interviewed talked about the substantial R&D work they had to conduct. **Technological development constitutes a large part of GT startups development**.

> The technological barrier is really high. It took years to develop the technology. [Startup 1]
>
> We are 3 co-founders, and the rest of the team is made of biologists. [Startup 4]
>
> We have 10 researchers; we were able to internalize our technology. [Startup 6]

Nevertheless, the actors who support this R&D phase do not have the same expectations and requirements as startups, which makes it sometimes difficult to work with them. More precisely, **Intellectual Property is a conflictual topic**.

> At the beginning, we worked with public laboratories, but it was complicated because we did not want to give up on Intellectual Property (…) and public laboratories do not work at the same pace. [Startup 2]
>
> We wanted to work with a SATT. But terms and conditions of IP were not acceptable. So, in the end we did not work with INRAE. [Startup 4]
>
> We did not talk about Intellectual Property with the SATT yet, it seems to be a difficult subject and the SATT avoids it. [Startup 7]

Moreover, **GT startups all need to have access to equipment and laboratories, even after the first R&D developments, in order to test their products.**

> We can have access to labs thanks to our PhD students. [Startup 6]
>
> We can have access to the equipment of a technological pole, and this is very interesting for us because such tools are very expensive. [Startup 4]
>
> We were supported by the incubator FoodShaker which gives access to some laboratories, which was enough to test our first products. [Startup 3]
>
> We have various partnerships: AgroParisTech, Air Liquide, to have access to some labs (…) We also work with some mutualized platforms, but they are very expensive. [Startup 1]
>
> Because we could not work with public labs, we had to pay some mutualized technological platforms to have access to the right equipment. But such platforms are very expensive, and it was more subcontracting than partnership. [Startup 2]

However, GT startups sometimes struggle to find the right infrastructures or equipment or technological platforms to conduct their R&D work. When they cannot work with labs, they have to pay technological and specialized platforms.

> It's hard to work with INRAE because there is no public research about this topic. [Vital Meat]
>
> We do not use the labs from INRAE because they are rapidly saturated, occupied, and because the equipment is insufficient: either in quality or quantity. [Startup 1]
>
> We lack some support, especially from INRAE: they cannot work on our topic apparently and we had to give up a project we started with them. [Startup 4]

5.2 GreenTech startups face specific challenges

5.2.1 Overcoming restrictive regulations and prejudices

A significant and recurrent challenge described by the informants is the barrier to access the market. Written and non-written rules are responsible for this barrier.

Some of **these rules are regulations** in the European Union or in France, which prevent or slow down the product or service's market launch.

> In the European Union, the list of algae that can be sold as food is very short (…) the European lobbying is huge (…) there are also a lot of problems about norms, and compositions. It is very complex. [Startup 6]

> The subventions are dedicated to specific technologies (…) regulations about hydrogen is very opaque in Europe and trade unions are focused on "green hydrogen" and its electrical application, or about electrolysis (…) There is a kind of lobbying. [Startup 7]

Moreover, **differences exist in terms of regulations, from one country to the other**, or from one continent to the other. Consequently, startups leave France for another and less strict country.

> Regulations from one country to the other are very different, and they are not always understandable (…) Other countries are more open to this kind of technology (…) I know that the United States finance such projects. [Startup 7]

> If nothing changes, all the products will come from the United States. [Startup 5]

> In terms of regulations, I know that the European market will be the slower to change. So, our target markets will be the United States, Japan and Singapore, who already express their position. [Startup 4]

> We are in contact with other companies in other countries, because France is late regarding this market. [Startup 1]

The other obstacle to overcome is the **prejudice and suspicion from the consumers** who are not always eager to try new products and must be educated, especially if the product or service is eminently disruptive for the consumers.

> Acceptability by the market is a real problem. There is a strong resistance from media and politics. It's a shame because France is in a good position in the agricultural field. [Startup 1]

> Research in our sector [meat created in laboratories] is demonized (…) Acceptability by consumers will happen gradually. [Startup 5]

> The subject of meat produced in laboratories is very controversial (…) the problem is that only few people work on the topic in France, so, only few people can defend this position. [Startup 4]

> We work a lot on the acceptability of our products by consumers. [Startup 6]
>
> Consumers are now more used to such products, so the barrier is not so high for us, although we work a lot on our communication. [Startup 3]

5.2.2 Finding money at the right time and in the right way

Because their development is long and highly capitalistic, **GT startups need a lot of money.**

> We need a lot of money, very rapidly, to be able to scale. [Startup 5]
>
> We need a huge amount of money to create our own labs and equipment, to apply for several patents, etc. [Startup 6]

Usually**, they try to beneficiate from subventions, and other non-dilutive money in the early phases** of their development.

> We got several subventions from Bpifrance, and then we also got some loans, once we were more developed. [Startup 4]
>
> When you are a GT startup, you should try to finance your project with nondilutive money as much a possible, at least until the Proof-of-Concept. [Startup 2]
>
> We got 110k€ of subvention from Bpifrance when we started the project. [Startup 3]

Only two of the CEOs interviewed talked about their difficulty to find enough money at the right time.

> We are in a maturation program with a subvention, but only a small amount of this subvention is dedicated to market research and business development, whereas we need to work on our strategy and business development if we want to choose the right and desirable applications for our technology. [Startup 7]
>
> We have a very good ecosystem in France when it comes to finding nondilutive money. But when you want to raise money, if you want to raise more than 100M€ it is complicated because we do not have enough funds specialized on green impact. [Startup 2]

5.3 How GreenTech actors perceive GreenTech startups

5.3.1 GreenTech startups definition

Surprisingly, **for the GT actors who were interviewed, the "GreenTech" definition was unclear**, sometimes unknown. Some of them had never heard of that term, although they immediately understood the concept with the sole name. Thus, each one of them had their own definition of a GreenTech startup, which was usually linked with their own activity.

> A GreenTech startup has a positive impact on the environment with its new technology (…) There are many sectors, but GT startups offer services and products for ecologic transition, and new ways of consumption. [Incubator 2]

> I did not know the GreenTech concept before this interview (…) but I guess for us it comes to biotechnologies, agriculture and bio-sourced materials. [Carnot 1]

> It's a startup which contributes to the energetic and ecologic transition (…) My competitive pole deals with the durable construction sector, so I only have GT startups. [Competitive Pole 1]

> A GT startup deals with environmental problems (…) In the UrbanLab we focus on durable construction, mobility and circular economy. [Incubator 1]

> GT is a very transversal technology: there are a lot of domains such as foodtech, agritech, smart cities. [Competitive Pole 2]

> We call it Eco innovation, and we define Eco innovation through the environmental and energetic transition challenges. [Technological Pole 2]

> GT startups create new technologies which take into account problems and needs related to climate change. [TTO 1]

> GT refers to technologies which are more respectful of the environment. It can be related to any technology, in our case it is biodiversity, new infrastructures for agriculture, biological production methods, etc. [Carnot 3]

> GreenTech is for every technology, service or product which reduces our impact on the environment [SATT]

Consequently, informants struggled to identify specific needs of GT startups. Since most of them only helped and supported GT startups, they did not know how those startups were different from the others. Thus, for the great majority of GT actors, **GT startups are just like any other startups.**

> I think GT startups have the same needs as other startups, the ones I identify are not specific to cleantech or eco-tech startups. At least, this is how I feel. [Incubator 2]

> I do not know how other startups are, but I guess all the startups have the same need. [Carnot Qualiment]

> GT startups are like other startups for us. [Incubator 1]

5.3.2 Importance of GreenTech startups for GreenTech actors

GT actors who were identified and interviewed all have their own ways of dealing with GT startups. GT incubators only work with GT startups, so 100% of their time and effort is dedicated to them. All the other actors also work with bigger companies, which cannot be considered as startups. The striking common point between these last actors is that **they do not have a precise idea of the proportion of GT startups they are helping**, among all the companies they deal with.

> The support to GT startups is a small part of the activity. We especially look for collaborative and partnerships contracts with companies. [Carnot 1]

> The proportion of startups is not identified, but it might be one third of all companies we help. [Carnot 3]

> I don't have a clear vision of the number of startups we work with, I should evaluate this activity. [Carnot 2]

> We can welcome up to 35 companies and we have more and more startups. [Technological Pole 1]

> Our support to startup represents roughly one third of the activity maybe… but we are working on developing further this activity. [TTO 1]

This common feature is sometimes explained by the fact **that helping GT startups is a quite recent activity**, or more exactly an activity that has been formalized only recently in in the structures that were initially not destined to startups in particular: Carnot institutes and competitive or technological poles.

> It's been a long time since we have been helping the creation of new activities, but usually, it was an activity directly developed in companies. The startup model is quite recent for us (…) We were helping startups without knowing it. There was no specific ecosystem for thme before, so it was harder. [Carnot 1]

> Recently, a lot of young companies are looking for our help. [Competitive Pole 1]

> For two years, huge efforts at the national scale are made to improve the GreenTech support of SATT. [SATT]

Another reason that was identified is that **most Carnot Institutes and Competitive or Technological poles do not consider that startups are different from other companies**, and thus, offer them the same services as companies, without distinction.

> For me, a startup is like any other company, so it can beneficiate from the support of the pole, however young or small it is. [Competitive Pole 1]

> We do not make any distinction. The definition of a startup is not a criterion for us. So, there is no specific offer or service for startups. [Competitive Pole 2]

> We are quite close to startups but there is no dedicated offer for them. [Carnot 3]

5.3.3 GreenTech startups needs from actors' perspective

Nevertheless, in some cases, one or two needs were identified as specific to GT startups during the interviews. More specifically, three specificities emerged. The first one was related to **regulations**. It appeared that governmental regulations are sometimes an obstacle for GT startups which offer a new kind of product or use a technology in a new way, which is not considered in existing regulations or which is forbidden.

> Sometimes regulations are not adapted or are extremely restrictive. So, GT startups need to be informed and helped to address this problem. [Incubator 2]

> Regulations exist and must be taken into account, especially for GT startups. [Incubator 1]

> There are some regulation barriers, which prevent emergence and growth of these startups. [SATT]

Another need identified by GT actors was the question of **market acceptability**. According to some of them, it is something all GT startups will have to deal with at some point, more than any other startups.

> They [GT startups] need more support and advice to work on the market acceptability of their product. [Carnot 3]

> GT startups offer alternative solutions. So, they have to demonstrate the performance of their product (…) Although the consumers' demands are more and more oriented to this GT sector, it is sometimes hard to prove their relevance. [TTO 1]

The third and last specific need that emerged from the discussions corresponded to **funding.** It seems that GT startups do not have the same needs in terms of finances. Most informants were quite vague about this notion, but one of them was more precise in the description of this particular need.

> Investors are not usual investors who pay big tickets. GT investors are funds with smaller tickets, and which exit earlier (…) Sometimes GT startups do not even raise funds, but instead rely on subventions, loans. (…) or investors come up at very early stages with micro-tickets. [TTO 2]

> Development costs are much higher than for other startups (…) The time-to-market is around 10-15 years for GT startups, so financial needs are around 100-200M€ minimum. [TTO 1]

> They have important needs of funding because it takes time to develop their technologies. [SATT]

5.4 Services offered by GreenTech actors to GreenTech startups

GreenTech actors try to answer GT startups' needs and to help them overcome their challenges developed in the last section. They offer various services, related to their own area of expertise or their own mission in the GreenTech ecosystem. This section focuses on the second research question related to the services offered by existing GreenTech actors to GreenTech startups.

5.4.1 Business support

The informants interviewed help startups develop their business in two ways: by developing partnerships thanks to the network of the actors, and by helping them structuring their business model.

All the GT actors that were interviewed claimed to be able to help **develop the partnerships of GT startups**. Carnot Institutes for instance, rely on a strong network of laboratories and experimental platforms.

> We can put founders or inventors in contact with researchers, laboratories, platforms (…) We also re-direct them to other Carnot Institutes or other structures such as INRAE Transfert. We have a good understanding of this ecosystem. [Carnot 1]

> We sometimes have a role of matchmaker with other structures such as competitive poles. [Carnot 2]

> France Futur Elevage is a network of research laboratories and agrotechnical institutes (…) We can put startups in contact with other infrastructures in our network, if they need specific infrastructures (…) Our objective is to increase partnerships. [Carnot 3]

SATTs, which have the role to bring technologies from laboratories to the market, have partnerships with laboratories but also develop connections with industrial partners. Thus, it seems that they can help startups develop partnerships with companies which could be their future clients. They also support startups in finding the appropriate VCs to raise funds.

> We put them in contact with VCs, industrial partners. [SATT]

Competitive poles and technological poles develop a network of companies: they work with companies and explained that they could put startups in contact with other companies if needed. Such poles are characterized by the fact that **they have a very good knowledge of their specific ecosystem.**

> We help startups to develop their network in three ways when they come to us. 1) They gain visibility and are presented to our clients and partners. 2) Our ecosystem is very favorable to establish partnerships, and we try to associate them with other SMEs. 3) We help them answer to call for projects which allow them to meet potential partners. [Competitive Pole 1]

> We put startups in relation with other actors: it can be industrials, if they have a product or a service that could be useful for the startup, it can be bigger companies to develop partnerships or sometimes if the company wants to buy the startup. [Technological Pole 1]

> Startups which come to us want to expand their market. We offer them visibility, we help them to identify and be in contact with future key clients (…) They can establish technical contracts or outsourcing, subcontracting or co-contracting (…) We try to establish connections between startups and the ecosystem around us (…) We try to interact with territorial collectivities. [Competitive Pole 2]

Incubators also help startups find their future clients by putting them in contact with companies.

> We have a good network of companies, and we can invite them to establish partnerships or make them meet the startups we help, because they can be potential clients for them. By answering call for projects, startups can also identify potential clients with our support. [Incubator 1]

> We have a wide diversity of partnerships: public, private… this is one of our great strength. We have big partners such as Orano, EDF, Sanofi. The founders of the incubator are big companies and public collectivities (…) We also organize workshops with companies [Incubator 2].

Among all the actors who were interviewed, only the two **incubators offer a specific service to help startups develop their business**. They have various tools and

resources to help them structure their business model: formations, specific programs, business coaching, to only cite a few.

> We follow each and every startup very closely, with activities for all startups and by meeting each one of them individually (…) We have a wide variety of workshops about entrepreneurship and business acceleration (…) Our strength is our personalized programs. [Incubator 2]

> We developed a complete support to help startups develop their product/service/business, etc., from creation to scaling. Four people are dedicated to the business support for startups. It is a very transversal business support. [Incubator 1]

Nevertheless, the informant from the Technology Transfer Organism (TTO), explained that in such organisms, a business support exists. These programs are only dedicated to startups which emerge from the research organism (spin-offs) and for the earliest development phases of the startup: ideation, sometimes creation.

> We encourage the creation of startups from INRAE: we listen to them when they have a project and help them understand how they can transform their research project into a company (…) We have a pre-maturation program to obtain a Proof-of-Concept and confront them to the market, to the users. Inventors can also have access to entrepreneurial formations and pitch in front of investors. We also put them in relations with other actors to find their co-founder for instance, or investors to be challenged (…) We support these spinoffs until the creation of the startup. Once the startup is created, we only keep in touch with the startup to make sure the business license is correctly used, or for visibility purposes. [TTO 2]

SATTs also help GreenTech startups to elaborate a first viable business model.

> We support startups until a viable business model is elaborated, usually until the first substantial fundraising. [SATT]

5.4.2 Scientific support

Just like business support, for scientific support, some actors can help startups by putting them in contact with other actors, and some actors can directly offer their expertise and their tools and resources to startups.

Incubators can only establish relations between startups and laboratories or technological platforms because, unlike to business, technology is not their domain of expertise.

> One of our team "Research&Co" is working on partnerships with schools and universities so that startups we accelerate could use their laboratories (…) Incubators do not have dedicated laboratories for startups. [Incubator 1]

> If startups need it, we have some partnerships with fablabs. [Incubator 2]

Competitive and technological poles do not all have the same resources. **Poles generally have a very good expertise of their own field and they use this expertise to re-direct startups to specific actors**, or to answer questions related to the application of the technology to the market. Some of them possess equipment, laboratories, and platforms that startups can use.

> We bring our knowledge about a specific GreenTech category, which is our domain of expertise. Because we are expert in this category, we know exactly which actor to contact for a specific need, which laboratory has the right equipment, etc. [Competitive Pole 1]

> We have a few machines (…) Each time a startup needs a specific equipment, we can contact another actor so that the startup can find the right laboratory or technical platform. [Technological Pole 1]

Actors who are dedicated to the scientific and technological development are TTO and Carnot Institutes. Each institute has its own field of expertise and owns several laboratories and platforms that the startups can use. The startups can also ask for scientific advice and the Institutes can rely on their technological or scientific knowledge, owned by their researchers. It is with these actors that startups can find the adequate technological support they need. Usually, **this support happens at the beginning of startup's creation, sometimes before the creation, but rarely after the seed phase.**

> Startups can have access to our labs, our platforms. We welcome the whole team in our laboratories so that they can use our equipment. We can also welcome their PhD students (…) We also bring knowledge, expertise, models, at the beginning of their

creation (…) This help to startups can come at a very early stage: when the idea just emerged. Sometimes, we can also help after some money was raised. [Carnot 1]

We have a network of experimental farms where startups can experiment their solution (…) Our researchers and infrastructures can help startups develop their idea (…) We help them right from the beginning of their project. Sometimes, startups come to us later, to develop a new service or a new feature to their existing product/service. [Carnot 3]

We offer services such as platforms for prototyping or to test their products/services (…) We can also work together on research question if the company is eager to invest in a laboratory (…) There is also a possibility to transfer expertise and competencies via a PhD student for instance. [Carnot 2]

We make the bridge between innovation in research and industrial development (…) We help startups to accelerate their technological development and achieve the Proof-of-Concept stage (…) if their project matches with our platforms, equipment, expertise. These services are offered to startups from our laboratories or not, and which need our tools, technologies, platforms, in order to reach the pre-industrial phase. [TTO 1]

SATT also help startups develop their technology, but after the technology is developed in the laboratories. They **support the technology maturation.**

We help them to develop their technology, to make it mature. We work on their Minimum Viable Product, first real-life tests, etc. [SATT]

5.4.3 Financial support

The GT actors who were interviewed were not investors, but they all help startup to find some money, mainly thanks to partnerships, support in the search for various money sources (fund raising, subventions, etc.) and subventions from the government.

Some of our partners are financial experts. [Competitive Pole 2]

We help them to fill the files to obtain the subvention, financed by Bpifrance and Paris (…) We help them to raise funds. [Incubator 1]

> We have some money allocated to experimental projects with startups so that startup do not have to pay. They can thus consult our researchers and conduct several experimentations for free. [Carnot 1]

> Sometimes, but it is very rare, INRAE Transfert takes shares in the startups. [TTO 2]

5.5 A French GreenTech ecosystem still under construction

5.5.1 A GreenTech ecosystem unclear and incomplete

For the actors who were interviewed, the French GT ecosystem is not structured yet: GT startups and actors lack visibility in this ecosystem, every actor identify itself as a reference for startups, and some essential startups' needs are still not properly addressed by the ecosystem.

First of all, according to GT actors, **the French GT ecosystem is still utterly opaque**, for startups as well as actors. The plurality of actors seems to be the reason for this opacity. Sometimes, the GT ecosystem is not even identified by actors who are part of it.

> The ecosystem is very varied and dispersed, which seems to be an obstacle to the development of GT startups. This ecosystem should be consolidated. [TTO 1]

> There is no specific GT event, or more exactly we did not identify any (…) I do not know if there is a GT ecosystem really. [Carnot 3]

> There is a wide variety of actors, offering different services for GreenTech startups. But all of these actors lack visibility. [Technological Pole 2]

> We try to decipher for startups, the ultra-complex innovative ecosystem. [TTO 2]

> This GT ecosystem is quite new and is still being developed. So, the offer is really broad. It should be more structured (…) A clarification is needed for startups to understand the role of competitive poles, incubators, etc. [Incubator 2]

> A lot of new incubators emerged to address the GT topic. But I do not know what the others do (…) More generally, in terms of GT actors, there are lots of them. [Incubator 1]

Second of all, because of this rather unorganized ecosystem, each informant who was interviewed regarded the structure to which he or she belonged, as a key actor in the GT ecosystem. **All GT actors in regions (not in the capital) declared to be a reference in this ecosystem:** either as a relay of information in a given geographical area and a specific field, or as the most strategic actor to collaborate with.

> Today, in the region, we have the role of a consultant in the field of durable construction: startups can get a lot of information by coming at us. Depending on their needs, we can re-direct them to the right actors or solutions (…) We are a relay of information. [Technological Pole 1]

> We are a valuable springboard for GreenTech startups. [Incubator 2]

> INRAE Transfert is a major and indispensable actor in the GreenTech sector. [TTO 2]

> We have a unique position: startups can have access to our industrial consortium, investors, researchers… we even create strategies at the financial and strategic levels. [TTO 1]

Third, the French GT ecosystem is still under construction according to GT actors, because **lacks in the support to GT startups could be identified**. The main lacks identified were funding and technical infrastructures.

> There is a huge problem in France: startups cannot raise as much money as in the United States (…) we support startups who know they could raise a larger amount of money in the US. Then, they must choose between raising less money or delocalize in the US (…) There is also a huge need for pilot units allowing startups to scale-up: startups sometimes have to wait a very long time before accessing such infrastructures, and this is not normal [TTO 1]

> I think some fablabs, workshops, where startups could test their products or services, are missing (…) more infrastructures should be accessible at a lower cost for startups. [Incubator 1]

> For two or three years, there are more and more VCs and investors focusing on startups with a positive impact on the environment. But only a few are mature enough. [Incubator 1]

> Raising funds is mainly possible in Paris, in the capital (…) it is too much centralized. [Competitive Pole 1]

> It is not easy to find the right financial support at the right time for GreenTech startups. [Technological Pole 2]

Finally, **GreenTech actors do not all have the same approach and do not have the same strategy to support GreenTech startups**. Multiple informants have been witnessing an increasing the number of GreenTech startups in the past few years, and thus want to **adapt their activity to support GT sups in the proper way**.

> We will soon have an incubation program for startups in the durable construction sector (…) as well as a R&D platform for startups who need a laboratory for their experimentations (…) For two or three years, we have a growing demand from startups in the Greentech sector. [Technological Pole 1]

> Nowadays, more and more startups are addressing this ecoinnovation market, sometimes without being aware of it. So, we have been working with ADEME for 5 years to offer better services. [Technological Pole 2]

> We try to adapt our offer to the evolution of startups (…) We just launched a new program for startups with a positive impact on the environment and for other startups wishing to take into account this problematic in their strategy. [Incubator 1]

> A lot of GT startups could be created with all the ongoing research projects of our partners (…) We want to develop our support to GreenTech startup, and we have a strategy until 2025. For instance, we want to create an investment fund to finance projects earlier. [TTO 1]

Other actors do not plan to change or adapt their offer and services, either because they did not notice any change or particular trend, or because they believe that a change in their strategy is not necessary, despite the GT trend observed.

> There are more and more GT startups because the ecosystem is more friendly with them for the past few years (…) We did not plan to adapt our support specifically to GT startups yet. [Carnot 1]

> We only have GT projects, so there is no particular change for us (…) We do not have a prospective activity dedicated to GT startups or SMEs, we just meet them during some events. [Carnot 3]

> There is an increasing number of startups recently, but not necessarily GT startups (…) We do not make a particular focus on GT startups (…) for me, it is just marketing (…) We had a focus on space once, but it's because we won a competition, and we were able to create a specific support for these companies. [Competitive Pole 2]

5.5.2 A limited collaboration between GreenTech actors

The lack of structuration of this ecosystem can be compensated by the collaboration between actors. Members of a given category of actors are more or less coordinated, and actors try to communicate across different categories. But this collaboration is sometimes superficial and far from being systematic.

Each structure interviewed, belongs or wishes to belong to a grand category of actors. It allows them to be more easily identified, and it gives a certain structure to the ecosystem. **Actors in a given category usually coordinate themselves to support startups**.

> There is a French association for competitive poles, to which we belong. We also belong to a smaller group of 11 competitive poles called "smart energy alliance". [Competitive Pole 1]

> We try to get the RETIS label, in order to improve our offer (…) We already rely a bit on the RETIS network to communicate with other actors. [Technological Pole 1]

> Toulouse White Biotechnology is a public structure which relies on several TTOs: CNRS, INRAE for instance (…) We have access to several platforms and labs, and we can work with various partners from these TTOs. [TTO 1]

> The Carnot network was created by Alain Dupré (…) and there are some synergies between Carnot Institutes sometimes. [Carnot 2]

> When GT startups come to us, we can put them in relation with our own researchers or with other Carnot Institutes, or (…) INRAE Transfert. [Carnot 1]

> We sometimes discuss with other incubators in the rest of France, and they sometimes send us some startups which want to try the Parisian market. [Incubator 1]

GT actors also make some efforts to improve the collaboration between the different categories of actors. These collaborations are quite limited and mainly consists in re-directing startups to other actors if the first one is not able to answer some needs and/or questions.

> We work in synergy with competitive poles, we are adherent to several of them, because we identified them as essential for startups to enter the market. This synergy is now structured thanks to a consortium which helps keeping a close contact. So, we put startups in relation with competitive poles. [TTO 2]

> France Futur Elevage works a lot with competitive poles (…) they organize some events with several actors to which we participate in to get more visibility. [Carnot France Futur Elevage]

> Startups sometimes come to us because they were sent by competitive poles (…) We need competitive poles who have a good knowledge of the ecosystem (…) We come as a complement of competitive poles, to capitalize on the research efforts. [Carnot 2]

> Every technopole has some relation with Carnot Institutes: if a startup needs a technical support or some specific tools, technopoles will make the link with its Carnot Institute partner. [RETIS]

> We know when to re-direct startups to investors and incubators (…) We also put them in relation with labs if they need some equipment that we cannot provide. [Technological Pole 1]

> We try to re-direct our researchers to the appropriate incubators (…) On the contrary, sometimes universities send us startups which need a scientific support. [Carnot 1]

> Recently, we have a closer link to incubators. Some of them just became our partners (…) Incubators send us startups which need our help. [Competitive Pole 1]

Moreover, **collaborations between different categories of actors are not always considered as essential**.

> We want to develop partnerships with Universities and labs (…) but we do not have much time to develop such partnerships. [Incubator 1]

> Startups know the ecosystem (…) they can find the right incubator themselves. [Competitive Pole 1]

The GreenTech Innovation network, developed by the government, was mentioned by 4 actors only. Three of them described it as a mean to develop their network and learn from each other. The last one explained how vague and unclear the role of this network was.

> We belong to the GreenTech Innovation network which enable discussions between actors, the share of good practices, and access to strategic contacts. [Incubator 2]
>
> We are a member of the GreenTech Innovation network and part of the jury to give the GreenTech label. We also conduct collective actions to help Greentech startups. [Competitive Pole 1]
>
> The GreenTech Innovation network is very reactive, and we regularly interact with the head of the network in order to interact with other actors and better understand how we can support GreenTech startups (…) The GreenTech Innovation network is now spread everywhere in France. [Technological Pole 1]
>
> We wanted to be part of this GreenTech Innovation network… but it is very unclear to us. [Technological Pole 2]

6. Discussion

6.1 Mapping of the French GreenTech ecosystem

Based on the literature review and on the findings of this study, it is possible to have a clear understanding of the current GreenTech ecosystem in France: its strengths and its weaknesses, roles of the actors in the ecosystem and their interactions. This photograph of the current French GreenTech ecosystem also enables to point out the improvements and efforts that various GreenTech actors have to make in order to improve their support to GreenTech ventures. The following section gives a mapping of the French GreenTech ecosystem in France throughout the entire development process of a startup and underlines existing lacks in this ecosystem.

6.1.1 Structure of the GreenTech ecosystem in France

The French GT ecosystem is still opaque today for two main reasons. The first one could be the vague definition of the term "GreenTech". Although everyone more or less understands what it means, no clear definition is shared by GT actors. As a consequence, every actor imagined or constructed its own definition. While most of these definitions are certainly close to the reality, the term "GreenTech" is sometimes used as a marketing tool by actors who do not really address GreenTech startups needs. Or, on the contrary the term itself is viewed as a marketing term and is thus neglected by actors who would be particularly interesting in the ecosystem because of their expertise and the services they could offer to GreenTech startups. The second reason is related to the youth of this ecosystem. Since no clear actor has yet emerged in the ecosystem, various actors identify themselves as a reference in the ecosystem. Consequently, the exact services offered by each type of GreenTech actor are usually vague for GT startups.

However, the roles of the various actors of the French GreenTech ecosystem could be identified thanks to the conducted interviews and the literature review. The three types of support offered by GT actors and needed by GT startups emerged from the interviews: Business support, Network and partnership, Technological support and equipment. The actors could then be positioned along the development stages of the

startup which were defined in the literature review: Ideation, Creation, Seed, Scaling and Expansion. The TRL 1, 2 and 3 of the deeptech startup development (Straub, 2015) are also represented to signify the importance of Carnot Institutes and TTOs in the earliest stage of startup development. GT actors could be positioned on this scale according to the definition of literature, and with the findings of the interviews from both GT startups and GT actors. The combination of these two points of view – literature and interviews, gave rise to a more objective vision of the services offered by GT actors, which are depicted in the next figure. Nevertheless, it is important to keep in mind that it was necessary to make some generalities in order to have a clear vision of the GT ecosystem. Thus, it is possible that some specific GT actors offer some services which are not considered in the figure.

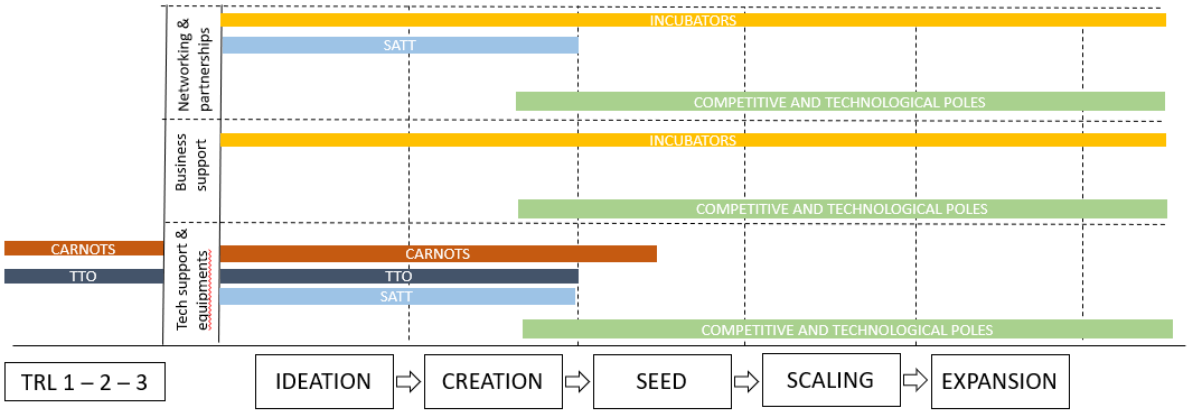

Figure 10: GreenTech actors services along the stages of development of a startup

As explained by prior studies, relationships and interactions between actors is as much important as the presence of these actors (Spigel, 2017). Findings of this study revealed that only a few actors interact with each other, and not in a regular way. One of the most striking results of this study comes from the place of competitive and technological poles in the ecosystem. Interviews revealed that they are strategic actors for GT startups because of the solid network they established. They have a precise knowledge of their ecosystem and can rapidly put GT startups in contact with incubators, Carnot Institutes or TTO, depending on the nature of their demand. Moreover, the literature review showed how crucial competitive and technological poles are in regions. These two observations make competitive and technological

poles, central actors in the French GT ecosystem. However, the study also showed that incubators, Carnot Institutes and TTOs do not systematically re-direct the startup they encounter or support to competitive poles. More generally, they tend to neglect other actors and the benefits they could draw from possible partnerships. If incubators may try to help startup identify the right laboratory to answer their needs, no formal or recurrent partnership exist between them. These interactions between GreenTech actors are depicted in Figure 11.

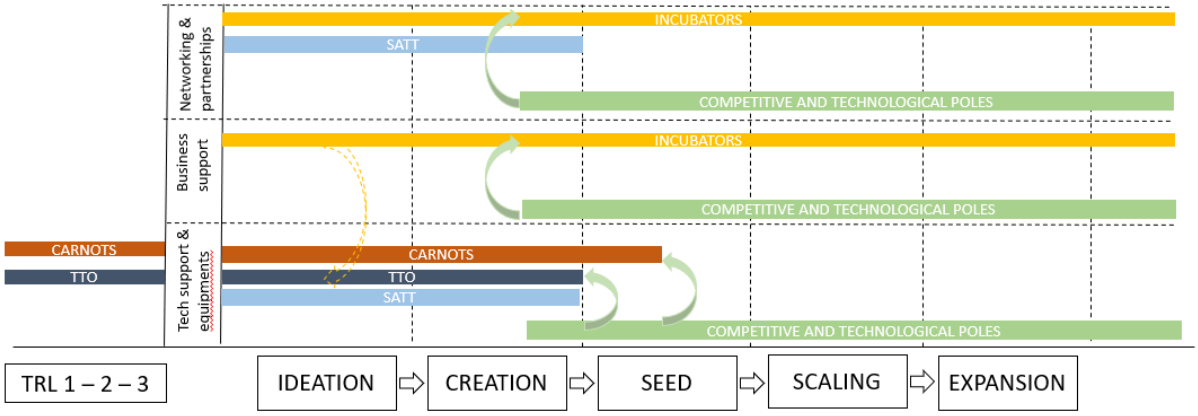

Figure 11: GreenTech actors' interactions

6.1.2 *Lacks in the GreenTech ecosystem*

Second, findings reveal that some GreenTech startups needs are not addressed by GreenTech actors. It appears that five needs and challenges evoked by GreenTech startups as crucial for them, were not taken into account by the GreenTech actors' interviews, or not in a consistent way.

The first one is related to the need for GreenTech startups to be part of a GreenTech startup community. GT startups particularly need this community because GT is still a young subject among startups: so, such startups need to exchange with their peers, to learn from each other in order to grow quicker, and to feel that others face the same problems as well. GT startups often talked about this desire whereas GT actors did not evoke it even once. This can be easily explained by the fact that GT actors have not started structuring their support to GT startups yet. Although most of them have been

acknowledging a clear growth of GT subjects in the projects they help, GT support in their overall activity is only recent: it usually accounts for a small part of their activity only, sometimes not even differentiated from their overall activity, and rarely their sole activity. Moreover, although the GreenTech Innovation network from the government is growing, it lacks visibility.

Two other unaddressed challenges identified while interviewing GT startups are linked to the technology they develop and their research and development work. GT startups encounter problems when comes the question of Intellectual Property, with their partners: SATTs, TTOs or Carnot Institutes. GT startups want the entire property of their technology in order to use it autonomously and independently while their initial partner with whom or thanks to whom they developed this technology want to keep this IP. This can lead to abandoned partnerships or unsolved problems. The other problem for GT startups when developing their technology is the availability of infrastructures, equipment, laboratories, etc. For them, such infrastructures are crucial even after the first R&D phase, in order to test their solutions and then to scale up with industrial means. GT actors are aware of this need: incubators and competitive poles try to put startups in contact with laboratories or universities. However, GT actors also acknowledge that not enough platforms are available for startups to try their solution in their early stages and later pass the industrial phase.

The two last challenges which are not enough considered by GT actors yet, are related to external factors: governmental regulations and acceptability of the new product/service by the customer. These two challenges were identified as real pain points by GT startups when they are ready to commercialize their products/services, whereas GT actors only evoked it when these specific needs were suggested during the interview. Even though they understand this need, they also seem not to be concerned. And indeed, GT startups usually feel helpless in front of these two challenges and would thus need more warning, formation and support, in order to be prepared to face these crucial questions.

6.2 Managerial implications

The findings of this study and their analysis in the previous section have a few implications for GT startups, GT actors and Bpifrance. The following section aims at providing some suggestions that these actors could execute to solidify the French GreenTech ecosystem.

6.2.1 Recommendations for GreenTech startup

GreenTech startups can get some new knowledge out of the results of this study.

First, results from the interviews can be useful to newly created GreenTech ventures who are eager to apprehend the difficulties, obstacles and needs they will face throughout their whole development. More specifically, according to the findings, a problem that seems to be frequently overlooked by startups at the beginning of their development, but which is of utmost importance, is the question of Intellectual Property. Consequently, the best advice that could be given to new GT ventures – and more generally deeptech ventures since it became evident that their needs are very similar, is to raise the question of Intellectual Property as soon as possible with their various partners, to avoid any misunderstanding or future tensions and deceptions.

Second, Figure 10 and Figure 11 are of particular interest for any GT startups looking for some clarity in the French GT ecosystem and willing to identify the best actor to contact in order to get the right support at the right time. If various actors argue to be able to offer business services, technical services or partnerships, only some of them can provide consistent support in each one of these categories, and these figures can be used as a guide to select the most appropriate ones. Moreover, ventures developing in regions or ventures wishing to address new market in regions, can now understand how crucial technological poles and competitive poles are. Thanks to their extended knowledge of their respective ecosystem but also thanks to their pertinent collaborations with other GT actors, they are undoubtedly the best interlocutors for GT startups in regions. A recommendation to GT startups would be to rapidly get in contact with the competitive or technological poles of their field in order to establish their own partnerships and develop their customers' list.

6.2.2 *Recommendations for GreenTech actors*

Thanks to the findings of this study, GT actors can possibly get new insights about the challenges faced by GT startups and better understand the position they occupy in the startup development process. These insights can help them adapt their support to GT startups if they are willing to do so: they can refine their services according to the expectations of ventures. Figure 10 and Figure 11 are also of interest for them: they can indeed easily identify the actors to whom they can re-direct startups which have a particular need they may not be able to answer alone.

More precise recommendations can also emerge from this study. The first one is that they should not consider GT startups as any other startups. If the findings showed that no specific "GreenTech" needs exist, interviews also showed that their needs were the same ones faced by deeptech startups. In this sense, GT startups are confronted with particular obstacles that must be considered by GT actors.

The second one would be to create a GT community in their own structure or network. Since most French GT startups are still freshly created, only a few models and examples to follow exist. Thus, GT ventures have a higher need to meet each other in order to learn from their respective experiences. Findings of this study revealed that GT startups have an urgent need to be together and support each other. Although startups can meet each other from their own initiative, GT actors have the role to facilitate and encourage the creation of such communities: GT startups they support will therefore have higher chances to grow and foster the creation of other Gt ventures.

The third recommendation might be more specific to incubators and technological or competitive poles. This suggestion deals with additional services and formation GT actors could offer to GT startups. As explained in the findings of this study, GT startups struggle to overcome the obstacles of governmental regulations and customer acceptability: they are sometimes unaware of them before addressing the market or do not have the right tools to address them. For this reason, incubators and poles might consider strengthening their support on these two particular aspects, through workshops or by establishing strategic relations with other actors (lawyers for instance). The other service which becomes rare, according to some GT startups and actors, is the possibility to access infrastructures, equipment and tools needed along

the various stages of the startup development. For newly created incubators or incubators willing to develop a focus on GT startups, the creation of such platforms or infrastructures in their facilities would be extremely useful. If this is not possible, especially because such platforms can be very expensive, startups and poles absolutely have to develop more partnerships with facilities offering this service. As explained before, partnerships between incubators and laboratories are rare, whereas they could alleviate this lack of industrial tools.

Finally, if GT actors truly wishes to improve their support to GT startups, they should measure the impact of their action and support, in order to identify margins of improvement and how they can increase and complete their offers. These measurements can encompass key performance indicators such as the number of GT startups supported, the number of GT startups who are still "alive" after several years, etc. but also more qualitative indicators such as comments, suggestions and evaluations from the ventures they support.

6.2.3 Recommendations for Bpifrance

Bpifrance, as much as GT actors and GT startups can use Figure 10 and Figure 11 in order to have a clearer understanding of the French GT ecosystem and how actors are interrelated. This mapping can be of interest for further strategy plans to develop this ecosystem, and to help GT startups.

Indeed, Bpifrance wishes to know how she can support GT startups and more generally the GT ecosystem. This smaller section suggests some actions that could be conducted by Bpifrance and which could improve, complete or solidify the French GT ecosystem.

First, results of the interviews demonstrated that GT actors do not always have a precise idea of the GreenTech definition and its implications. Moreover, they sometimes ignore the challenges GT startups face. Most of them do not give a particular attention to the "GreenTech" sector, especially Carnot Institutes and TTOs whereas they are the institutions where the new "green technologies" are developed. For these reasons, if Bpifrance wants to see an increase in the number of GT startups created, she has an important effort of formation and sensibilization about GreenTech to do.

Formation and sensibilization could also be useful for GreenTech startups who want to understand the French ecosystem better. This study can be a basis for Bpifrance to write a note for GreenTech startups so that they can easily identify GT actors.

Another straightforward implication from the findings of this study, is the need to create a GreenTech community. As previously explained, GreenTech startup have an urgent desire to share their experiences. Since Bpifrance finance most GreenTech startups in France, it seems reasonable for her to take this role of a community leader. Events regrouping GreenTech startups would be a good first step, and Bpifrance already demonstrated she has the means to organize impactful events. Moreover, to foster the creation of GreenTech ventures, the "GreenTech" culture in France needs to grow (Spigel, 2017). Significant communication campaigns could be deployed to spread success stories of GreenTech startups and to distillate more GreenTech knowledge.

Results of the study also proved that the GT network was not yet sufficiently developed. Connections between GT actors are rare, whereas prior studies underlined how essential interactions were, for an ecosystem to be efficient (Spigel, 2017). The most urgent interconnections to create are between incubators and laboratories (TTOs, Carnot Institute, etc.). It is evident that the lack of such partnerships hinders the development of GreenTech startups. To encourage interactions and communication between incubators and laboratories, Bpifrance could fund programs aiming at establishing partnerships between these actors. Indeed, GT actors usually see such relations as a waste of time, and they must see an advantage for them to make this effort.

More generally, more connections should be established between GT actors. The GreenTech Innovation network launched by the government is still young, small, fragile and develops only slowly. Nevertheless, Bpifrance cannot take the role of a new agent of connections between GT actors because of the already opacity of the ecosystem. A new actor taking a position of intermediary would only increase this effect. Hence, a solution could be to support this network by offering grants and rewards for newly formed partnerships between actors, and by organizing special events or programs to foster collaboration.

6.1 Theoretical implications

This study also contributes to prior academic literature. Prior literature regarding GreenTech startups specific needs can be contrasted by the findings of this empirical research.

The first research question addressed GreenTech startups specific needs compared to other startups. Prior studies identified three grand categories of GreenTech startups specific needs: 1) the need for a lot of money (Baltes & Büchele, 2015), preferably non-dilutive money, and for a long time because of the capitalistic nature of GT startups and a very long time-to-market (Silverberg, 2015), 2) the need for a specific support in developing new technologies (Hao, 2018) and adapting them to existing restrictive regulations (Herweijer & Azhar, 2020), 3) the need for a strong and supportive ecosystem, required by the two precedent needs (Hoff, 2012). However, these needs were already identified for deeptech startups (Bpifrance, 2019) and no need which would be only related to GreenTech startups could be identified. Thus, this study did not aim at validating or invalidating hypotheses but explored the needs faced by GreenTech startups in order to identify the presence or the absence of specific needs for GreenTech startups.

Findings confirm that the three types of needs identified in prior literature are indeed faced by GreenTech startups Gt startups have to spend a lot of time, looking for money and they have to raise more money than regular startups because their research requires expensive infrastructures and a lot of time. Consequently, they look for specific support, and rely a lot on subventions and public help. Moreover, because they develop new technologies, GreenTech startups need some specific support and specific infrastructures. They also need help to decipher existing regulations and overcome them or to identify the right market, the right country which will welcome a new, disruptive technology. Finally, the need for a structured and complete ecosystem is intense because of all these challenges: a coordinated support from the government, laboratories, incubators is crucial. Additionally, GreenTech startups look for a strong community of other GreenTech startups who share their values but also the same problems.

This study also shows that GreenTech startups do not have specific needs compared to other startups, or more exactly, they have the same specific needs as deeptech startups. The needs which were developed in the previous paragraph are the same ones that deeptech startups encounter.

7. Conclusion

This study aimed at offering a clearer vision of the French GreenTech ecosystem in order to understand how GreenTech actors are supporting the creation of GreenTech startups, and how this support could be improved. Based on qualitative research on GreenTech actors & startups, it can be argued that lacks in the support to GreenTech startups exist but could be addressed thanks to a more cooperative ecosystem.

The French GreenTech ecosystem is still opaque for both GreenTech actors and GreenTech startups. The plurality of actors and services as well as the vague comprehension of the "GreenTech" definition explain this opacity.

GreenTech startups face, like any other startups, needs and challenges. They do not face specific "GreenTech" obstacles, but they do meet challenges which are specific to DeepTech startups: finding large amounts of money, overcoming regulations and prejudices. They also struggle to find the right infrastructures for their R&D development in their scale-up phase and wish to feel part of a GreenTech community.

GreenTech actors offer regular services to GreenTech startups: business support, technical help, funds, networking. However, GreenTech actors do not necessarily tailor their support to GreenTech startups: they do not always make a difference between them and other startups or other companies. Moreover, the cooperation and partnerships between different GreenTech actors seems to be feeble, thus exacerbating the opacity of the ecosystem and the difficulty for startups to overcome challenges. Although Competitive and Technological Poles usually have a clear understanding of their ecosystem and usually interact a lot with all actors, interactions between other actors are rarely as efficient or as regular.

Therefore, to improve their support to GreenTech startups, GT actors must be more aware of the specificity and needs of GreenTech startups, but also formalize their infrastructures to GT startups to evaluate and improve it. More interactions and collaborations between them could also help addressing the identified lacks in their offerings. More cooperation between them could indeed help GT startups to feel part of a GreenTech community, in a clearer ecosystem, and would definitely facilitate the identification of already existing R&D platforms they struggle to find. Finally, more

R&D industrial infrastructures should be available, so that GT startups can scale up more easily.

The findings are relevant for both actors and startups. The results of the study can help them better understand the role of each GT actor and to have an overview of the French GreenTech ecosystem. GT startups can discern the services they can have access to and with which actors. GT actors willing to improve their support to GT startups can prioritize their actions, based on the GT startups needs and the lacks in their support which were identified.

This research work presents a few limitations which must be considered. First, the research relies on a qualitative data analysis, with subjective interviews as the primary data. Consequently, answers collected among interviewees only mirrors their own perspectives and points of views. Thus, they do not engage the company or laboratory they are attached to.

Furthermore, differences exist between two SATT/Incubators/Competitive Poles/Technological Poles/Carnot Institutes/TTOs. 2 actors of the same category do not necessarily have the same approach to support startups, or do not offer the exact same services. As a consequence, the list of services described in this study is not exhaustive, and the recommendations might not be applicable to all GT actors.

Finally, the interviews of GreenTech startups were conducted by a third party, and the analysis of these interviews in the present research work only relied on notes taken by the interviewer. Thus, some statements from GT startups might have been misinterpreted. Moreover, only startups from the “Mobility” and “Agriculture & Agrifood” sectors were interviewed. The needs and challenges which were identified in this study might be specific to startups evolving in these two environments, and not be representative of all GT startups.

Following the results of this research, several proposals for future research on the GreenTech ecosystem in France could be developed. First, the sample of GreenTech startups interviewed only focused on two GreenTech sectors. Therefore, futures studies could examine GT startups from other sectors, in order to confirm the absence of specific needs for GT startups, compared to “regular” startups.

Second, to further help startups to identify the right actors throughout their development stages, more precise mappings of actors and the detailed services they offer to startups could be elaborated. A mapping of this nature, for each one of the six GreenTech sectors would be of direct interest and use for GreenTech startups.

Third, this study considered “GreenTech” as an independent sector. It could be worth questioning this position. Instead of seeing GT as an independent sector, GreenTech could be considered as a characteristic of every sector, or as part of other sectors. Future research works could investigate both point of views: one GreenTech sector or Greentech as part of other sectors; because it changes the ecosystem which is considered. In order to initiate a true energetic and environmental transition, it might be indeed more efficient to think of GreenTech as a characteristic of other “tech sectors”, so that each industrial sector can make its transition.

As a conclusion, this study gives an overview of the GreenTech ecosystem in France and provides a mapping of GreenTech actors to clarify their role in the development of startups, as well as recommendations to improve this ecosystem.

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Appendix: Interview guide

Introduction

- Structure of the interview and permission to record the interview. Anonymity, confidentiality, right to withdraw.
- Introduction of the topic and thesis
- Background: title/position, brief description of the structure (geographic position, stage of the startup)

Context

- What is the role of startup support within all activities of the organization?
- In what type of startups do you focus? How important are GT startups for you?
- If a company approaches you, what indicators do you use to determine whether it fits your criteria for a) startup b) GT startup?
- Since when startups/GT startups have been part of your activities?

Intervention and mechanisms

<u>Your role as a GreenTech actor</u>

- At which step of the startup do you "step in"? (Ideation, creation, seed, etc.)
- Which need do you identify for GT startups?

<u>GreenTech ecosystem</u>

- Which other services than yours, do GT startups use?
- Which other actors are relevant to you? With which ones do you actively cooperate with? With which one do you feel a particular need to be coordinated with?
- Do you work with incubators/SATTs/OTTs/Technological or competitive poles/Carnot Institutes?
- Do you think the current ecosystem is relevant for GT startups?
- How would you improve it/change it?

Outcomes

- How do you evaluate your support to GT startups? How do you know if your services were useful?
- When it comes to GT startups, did you see an evolution in the past 5 years in terms of numbers, type of projects? Did you take it into account in your accompaniment strategy? Or do you plan to take it into account? How?